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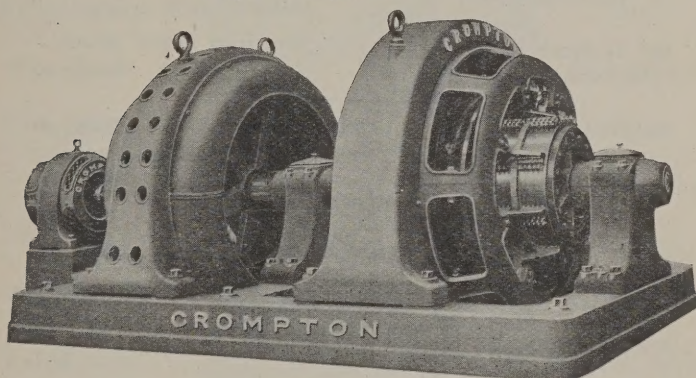
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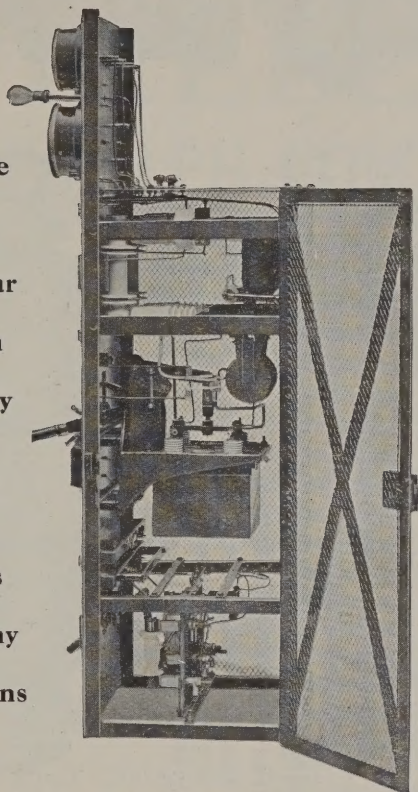
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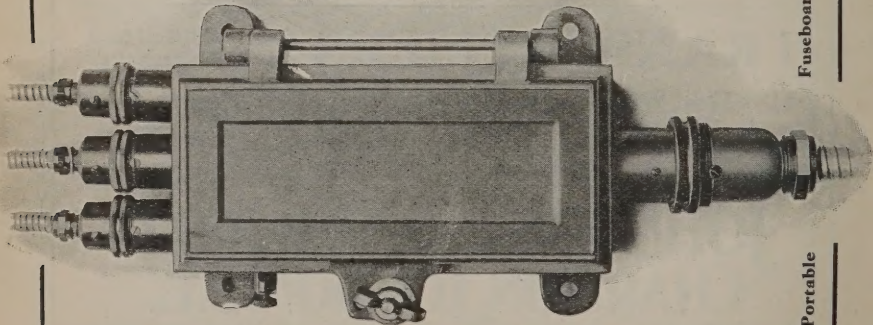
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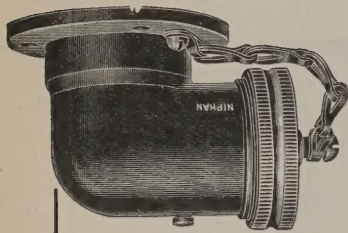
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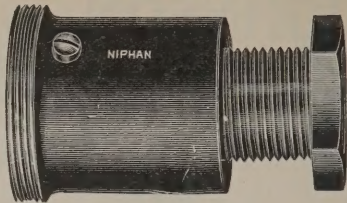
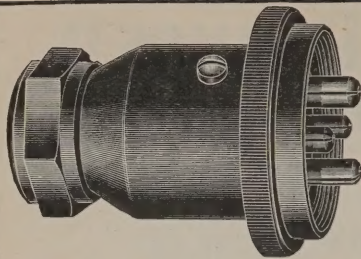
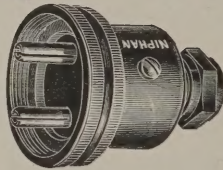


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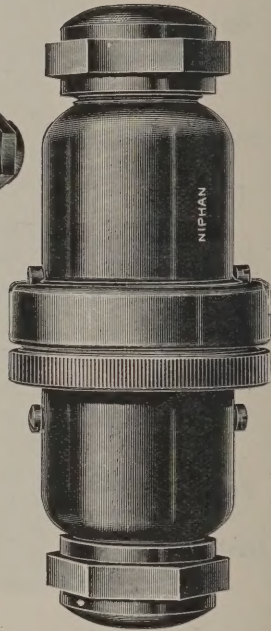
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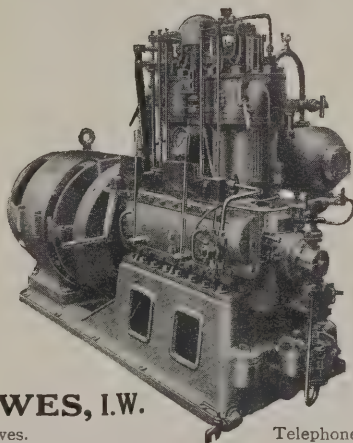
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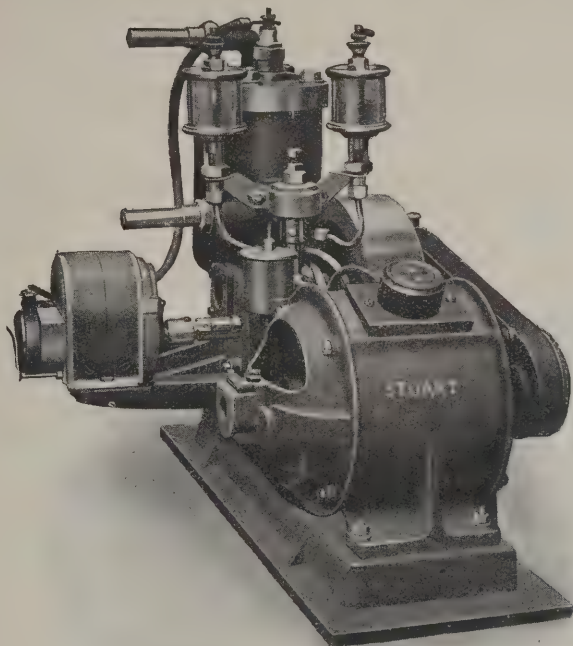


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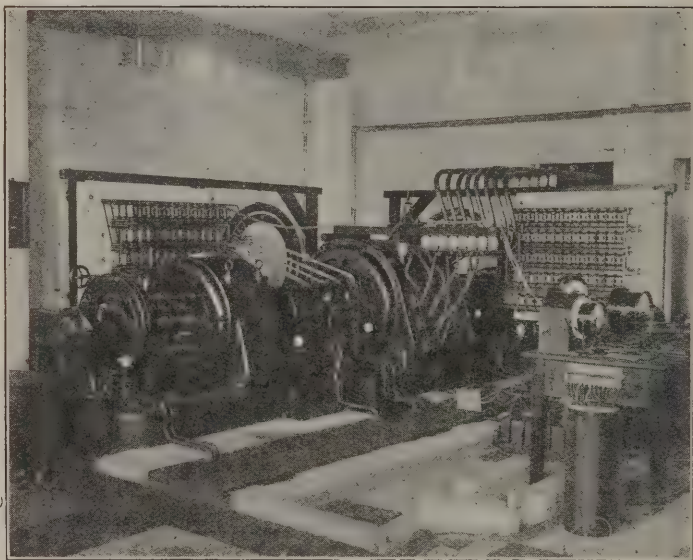
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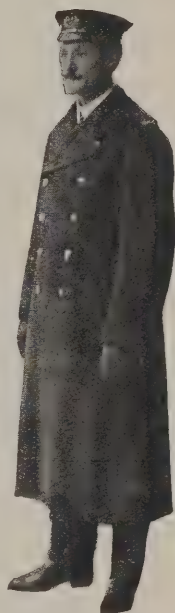
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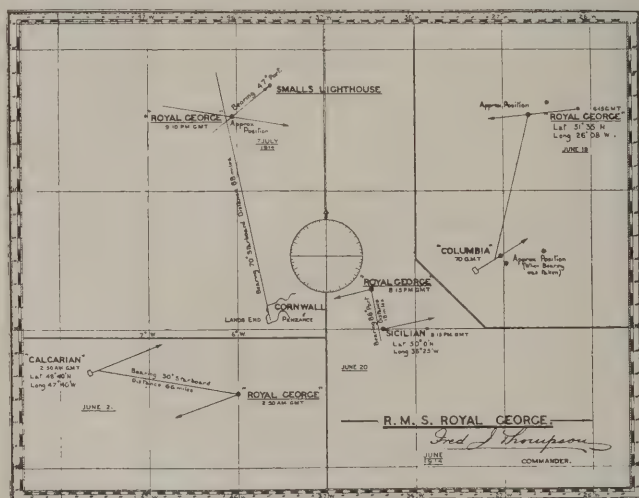
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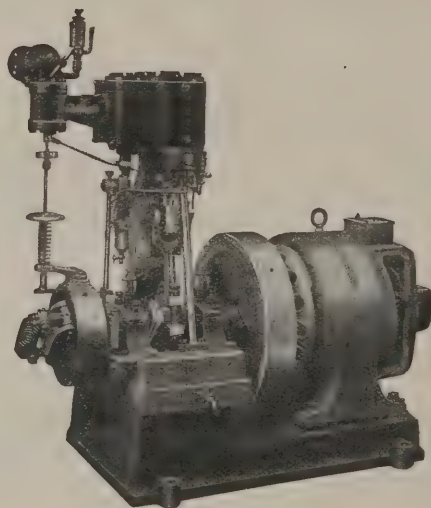
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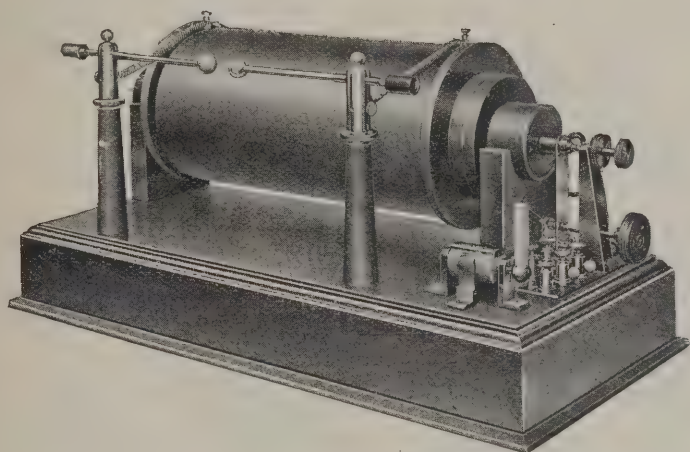
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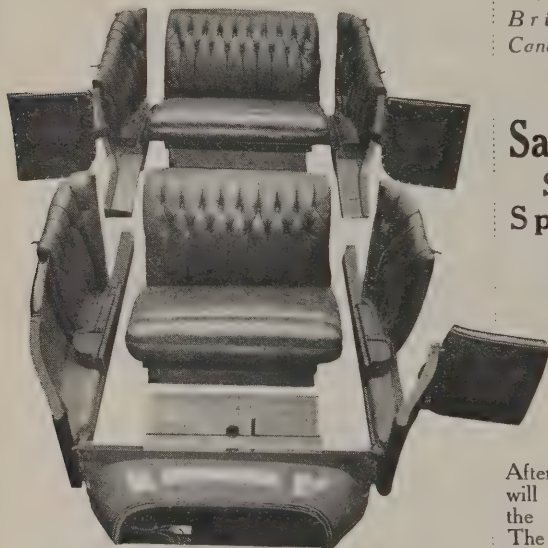
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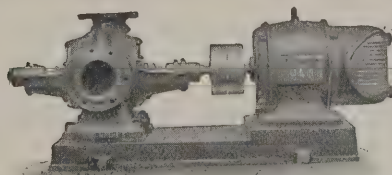
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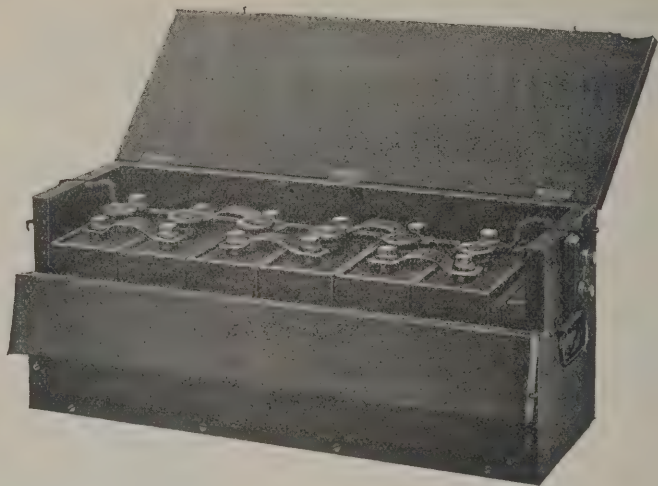
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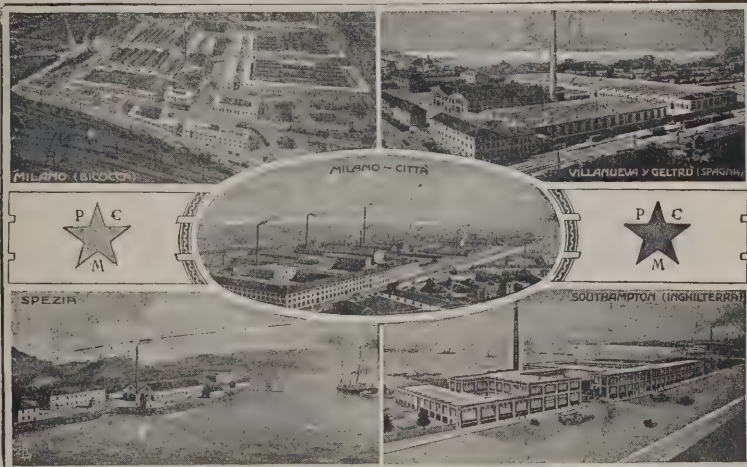
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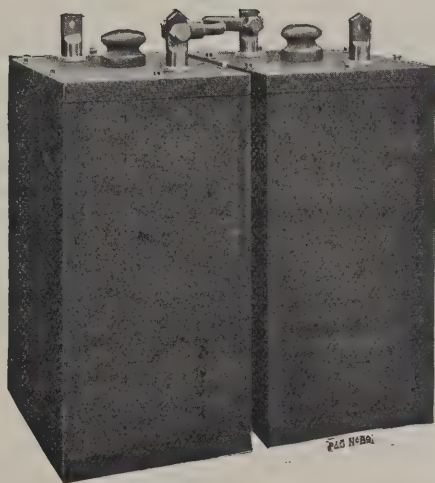
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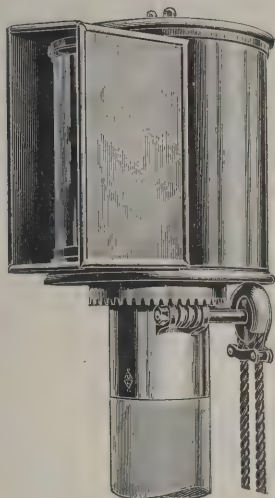
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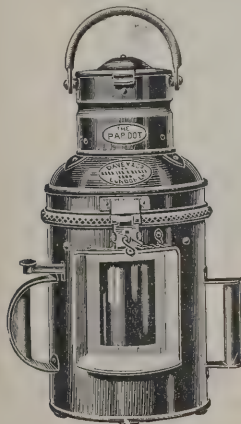
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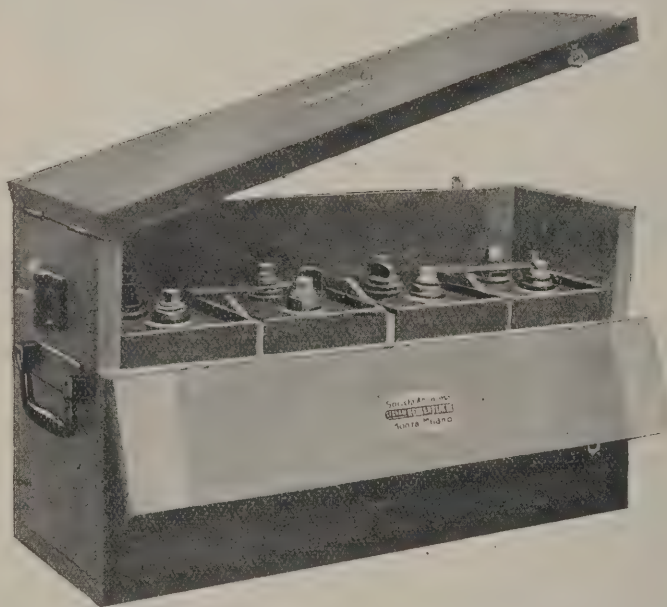
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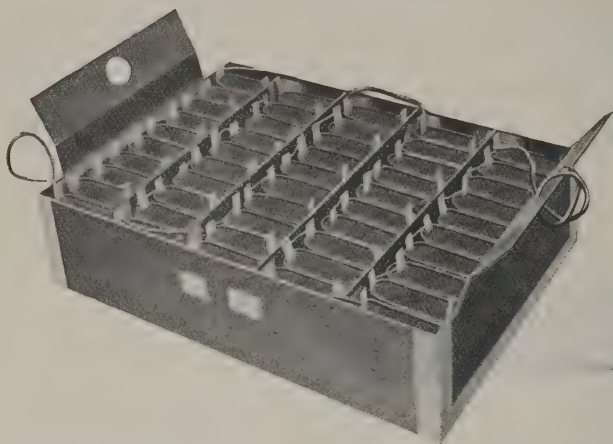
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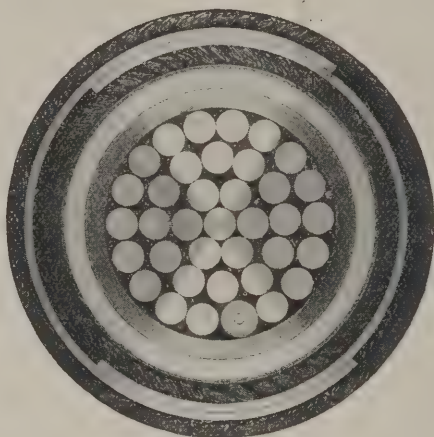
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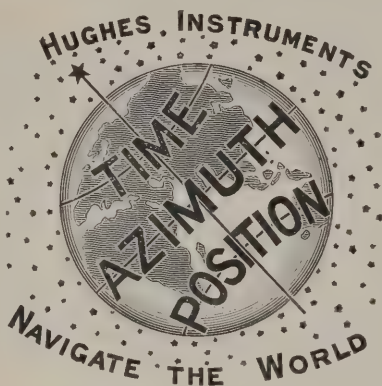
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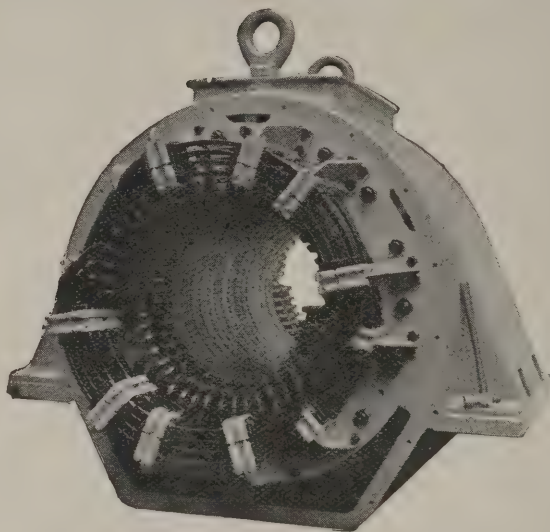
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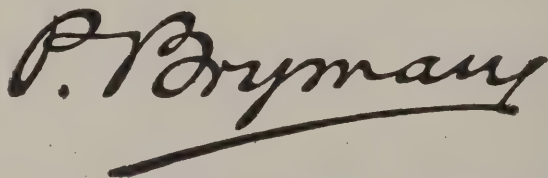
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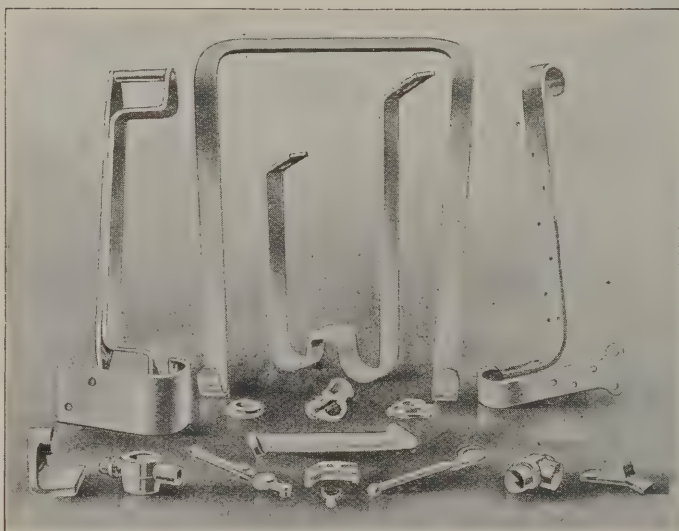
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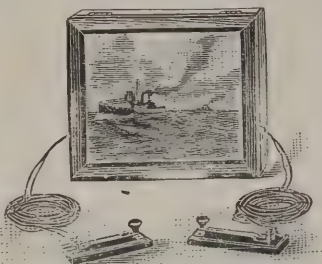
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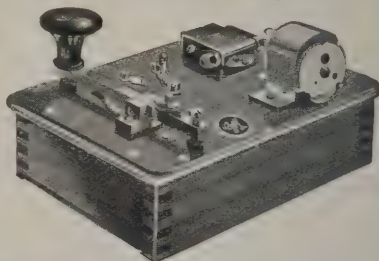
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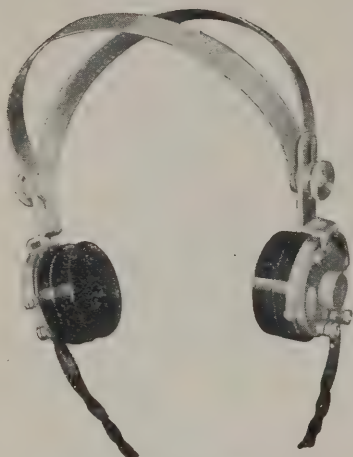
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P R E F A C E

SINCE the appearance of our last issue, wireless telegraphy has continued to progress in every direction ; although the increased stringency of war conditions has not rendered easier the task of recording its advance. Nevertheless, the fact that in these days of paper shortage and printing difficulties we have been constrained to increase by over 230 the number of our pages, cannot fail to " speak volumes "—in more senses than one.

Perhaps the most striking evidence of radiotelegraphic expansion is contained in the section devoted to the LAWS AND REGULATIONS, current in different countries. The text thereof, which in 1917 was included in 273 pages, now occupies 463. The index alone shows an increase from 25 to 31 pages. This section has received an extremely careful revision, and we trust that the brief summaries of earlier legislation and present organisation affecting wireless telegraphy in the different countries, *which are now included for the first time*, will enhance the utility and interest of our volume.

We owe much of the success which has attended our efforts to the courteous co-operation of the chief officials presiding over the Government Departments under which wireless is organised. Despite the fact that the United States of America have plunged into the vortex of the world's struggle, Mr. Redfield, the U.S.A. Secretary of Commerce, has given us invaluable aid in our notes on Wireless Regulations ; whilst Captain Powhatan Page, head of the Argentine Radiotelegraphic Office ; Dr. Wichi Torikata, Chief of the Japanese Wireless Research Laboratory, and many other important foreign and Colonial officials have afforded similar assistance with regard to their respective spheres of activity.

In truth, we have benefited so much by official courtesy in this respect, that we must ask our friends abroad to understand that it is lack of space, not of will, which prevents specific acknowledgment in every instance.

The LAND AND SHIPS' STATIONS section, which records the Call Letters and general particulars of wireless installations all over the world, has been made as complete as circumstances allow. It will easily be understood that the exigencies of warfare prevent the inclusion of a considerable number of items ; but the information given in our pages has been carefully verified and will be found reliable.

For the SPECIAL ARTICLES section we have once again been able to secure a paper from Dr. J. Ambrose Fleming, who has contributed to the successive series of the YEAR-BOOK uninterruptedly from our first appearance. Readers will regret to notice that Dr. Eccles, who

PREFACE.

had hitherto been able to afford us the same continuous support, was obliged this year to drop out, owing to the heavy pressure of national work. We are able to include an article from a Dutch scientist and a contribution dealing with the wireless side of America's entry into the war from the Secretary of the Institute of Radio Engineers. Some notes (accompanied by photographs) on outstanding instances of HEROISM displayed by wireless telegraphists during 1917, as well as an article recording wireless achievements in LIFE-SAVING AT SEA, are included in this section. One of the most interesting contributions, from a technical point of view, consists of a series of analytical notes on the VALVE PATENTS PUBLISHED DURING 1917. This has been specially prepared for us, and should prove of great value to all readers interested in radiotelegraphic practice.

The USEFUL DATA section remains as revised by Dr. Erskine Murray. It has proved its utility to such a degree that—realising the desirability of expanding it, and finding ourselves unable to carry this out within our compass—we have decided to enlarge and reprint it in an improved form as a special volume.

A number of new BIOGRAPHICAL NOTICES are included, and, alas ! an obituary, recording the decease of Mr. Wm. du Bois Duddell and Captain Camille Tissot.

The WIRELESS MAP OF THE WORLD was last year enlarged into a duplicated Mercator, and so favourably received, that no further change of format has been made. But the positions of the stations have been carefully checked, and a number of additions inserted, bringing the total up to over 800 entries.

The ILLUSTRATIONS have been selected so as to include (*a*) historic apparatus like that used by the late Mr. Duddell in his investigations and discoveries ; (*b*) the most recent type of wireless instrument ; (*c*) interesting views of foreign stations ; and (*d*) fresh portraits of leading men in the radiotelegraphic world.

We cannot conclude these introductory remarks without adding to our former expression of gratitude for help, some appreciation of kindly co-operation on the part of the representatives of the various Marconi Companies located in Australia, the United States of America, Brazil, Argentina, and other countries.

THE EDITOR.

Marconi House, Strand.

April 1st, 1918.

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JAPANESE WIRELESS STATION AT FUNABASHI: ONE OF THE
NINETEEN MASTS.

JANUARY, 1918

1	T	Prof. Hertz died, 1894. Ship messages accepted at British post offices, 1905.
2	W	Capitulation of Port Arthur, 1905.
3	Th	
4	F	
5	S	
6	S	Epiphany. Twelfth day.
7	M	
8	T	
9	W	International Conference for Safety of Life at Sea closed, 1914.
10	Th	British Penny Postage established, 1840.
11	F	HILARY LAW SITTINGS BEGIN.
12	S	
13	S	1st Sunday after Epiphany
14	M	Duke of Clarence died, 1892.
15	T	Sandwich Islands discovered, 1778.
16	W	
17	Th	Benjamin Franklin born, 1706 ; died, April 17th, 1790.
18	F	Captain Scott reached S. Pole, 1912.
19	S	" Princesse Clémentine " ran ashore. News wirelessly to Ostend, 1901.
20	S	2nd Sunday after Epiphany " Safety of Life at Sea " Convention signed at London, 1914.
21	M	
22	T	Accession of Edward VII., 1901.
23	W	" Republic " wrecked, 1909. Passengers and crew saved.
24	Th	Naval Battle off Dogger Bank, 1915.
25	F	
26	S	
27	S	Septuagesima Sunday William II., German Emperor, born, 1859.
28	M	Röntgen Rays discovered, 1896.
29	T	Capitulation of Paris, 1871.
30	W	Anglo-Japanese Treaty signed, 1902.
31	Th	" Great Eastern " steamer launched, 1858.

FEBRUARY, 1918

1	F	
2	S	Candlemas Mr. Marconi lectured on wireless before the Royal Institution, 1900.
3	S	Seragesima Sunday Telegraphs transferred to Government, 1870.
4	M	
5	T	Thomas Carlyle died, 1881.
6	W	
7	Th	
8	F	War between Japan and Russia began, 1904.
9	S	First Australian Commonwealth wireless station opened, 1912.
10	S	Quinquagesima Sunday Queen Victoria married, 1840.
11	M	Thomas Alva Edison born, 1847.
12	T	Shrove Tuesday
13	W	Ash Wednesday
14	Th	
15	F	Sir Wm. Preece born, 1834 ; died, November 6th, 1913.
16	S	
17	S	1st Sunday in Lent
18	M	German submarine blockade instituted, 1915.
19	T	Alessandro Volta born, 1745 ; died, March 5th, 1827.
20	W	Panama-Pacific Exhibition at San Francisco opened from Washington by wireless, 1915.
21	Th	Validity of " Four Sevens " Patent upheld by Justice Parker, 1911.
22	F	Prof. H. Hertz born, 1857 ; died, January 1st, 1894.
23	S	Johann Karl Friedrich died, 1855 · born April 30th, 1777.
24	S	2nd Sunday in Lent St. Matthias Mr. Marconi lectured on " The Commercial Application of Wireless Telegraphy " at Liverpool, 1908.
25	M	
26	T	C.G.C. " La Provence " sunk in Mediterranean, 1916. 870 persons saved.
27	W	P. & O. " Maloja " mined and sunk off Dover, 1916.
28	Th	

MARCH, 1918

1	F	Wireless Service inaugurated between Hawaiian Islands, 1901.
2	S	Mr. Marconi lectured on Wireless Telegraphy before Institution of Electrical Engineers, 1899.
3	S	3rd Sunday in Lent Dr. Alexander Graham Bell born, 1847.
4	M	Inauguration Day, U.S.A.
5	T	Frederick Anthony Mesmer died, 1815. Alessandro Volta died, 1827 ; born, February 19th, 1745.
6	W	
7	Th	
8	F	
9	S	
10	S	4th Sunday in Lent
11	M	
12	T	Wireless meteorological messages first transmitted from Macquarie Island, 1912.
13	W	British occupation of Bagdad, 1917.
14	Th	Millwall Docks opened, 1868.
15	F	
16	S	Georg Simon Ohm born, 1787 ; died, July 7th, 1854. Abdication of Tzar, 1917.
17	S	Passion Sunday ST. PATRICK'S DAY. Russian Revolution, Provisional Government Programme, 1917.
18	M	Grover Cleveland born, 1837.
19	T	
20	W	Sir Isaac Newton d., 1727 ; b., Dec. 25th (O.S.), 1642.
21	Th	Vernal Equinox.
22	F	
23	S	
24	S	Palm Sunday H.M.S. "Eurydice" foundered, 1878.
25	M	Annunciation. Lady Day.
26	T	
27	W	HILARY LAW SITTINGS END. English Channel spanned by wireless, 1899.
28	Th	Hospital Ship "Asturias" torpedoed, 1917.
29	F	Good Friday
30	S	First Transatlantic marconigram published in <i>The Times</i> , 1903.
31	S	Easter Day Robert Wilhelm Bunsen b., 1811 ; d., August 16th, 1899.

APRIL, 1918

1	M	Easter Monday Bismarck born, 1815 ; died, July 30th, 1898.
2	T	Easter Tuesday
3	W	
4	Th	
5	F	First licence granted for erection of Italian high-power station, 1903.
6	S	Prof. Adolf Slaby died, 1913 ; born, 1850. Commander Peary reached North Pole, 1909.
7	S	Low Sunday United States declared war on Germany, 1917.
8	M	Anglo-French Convention signed, 1904.
9	T	EASTER LAW SITTINGS BEGIN.
10	W	
11	Th	American Civil War began, 1861.
12	F	Albert Medal (Roy. Soc. of Arts) presented to Senatore G. Marconi, 1914.
13	S	
14	S	2nd Sunday after Easter President Lincoln assassinated, 1865.
15	M	"Titanic" disaster, 1912 ; over 700 lives saved.
16	T	
17	W	Mr. Marconi lectured on "Progress of Wireless Telegraphy" before New York Electrical Society, 1912.
18	Th	
19	F	Byron died, 1824.
20	S	
21	S	3rd Sunday after Easter
22	M	
23	T	S. GEORGE'S DAY.
24	W	French Marconi Company formed, 1903.
25	Th	Senatore G. Marconi, G.C.V.O., born 1874. Marconi International Marine Communication Co., Ltd., formed, 1900.
26	F	"Four Sevens" Patent granted, 1900.
27	S	Samuel F. B. Morse born, 1791 ; died, 1872.
28	S	4th Sunday after Easter "Bounty" Mutiny, 1789.
29	M	Issue of Regulation for compulsory wireless on British vessels of 3,000 tons and upward.
30	T	Johann Karl Friedrich born, 1777 ; died, February 23rd, 1855.

MAY, 1918

1	W	Wireless Telegraph Service between Italy and Spain inaugurated, 1915. [1917.
2	Th	Marconi made member of Italian mission to U.S.A.,
3	F	Jamaica discovered, 1494.
4	S	
5	S	Rogation Sunday Napoleon I. died, 1821 ; born August 15th, 1769.
6	M	ACCESSION OF KING GEORGE V., 1910.
7	T	S.s. " Lusitania " torpedoed, 1915.
8	W	Eruption at Martinique, 1902.
9	Th	Ascension Day
10	F	Imperial Institute, London, opened, 1893.
11	S	
12	S	Sunday after Ascension Windhuk wireless station captured, 1915.
13	M	Wireless communication established over a distance of eight miles, 1897. Joseph Henry died, 1878 ; born December 17th, 1797.
14	T	
15	W	Mr. Marconi lectured on " Syntonic Wireless Telegraphy " before Royal Society of Arts, 1901.
16	Th	
17	F	EASTER LAW SITTINGS END.
18	S	New Eddystone Lighthouse opened, 1882.
19	S	Whit Sunday Czar Nicholas II. of Russia born, 1868.
20	M	Whit Monday Christopher Columbus died, 1506.
21	T	Whit Tuesday " Lake Champlain," first British merchant vessel equipped with wireless, 1901.
22	W	
23	Th	Italy declared war on Austria-Hungary, 1915.
24	F	EMPIRE DAY. [1917. Marconi in Washington with U.S.A. official mission,
25	S	Lloyd's Incorporated, 1871.
26	S	Trinity Sunday. Queen Mary born, 1867.
27	M	
28	T	TRINITY LAW SITTINGS BEGIN.
29	W	" Empress of Ireland " disaster, 1914 ; 541 lives saved.
30	Th	Corpus Christi. Decoration Day, U.S.A. Hospital ship " Dover Castle " torpedoed, 1917.
31	F	Great Naval Battle off Jutland, 1916.

JUNE, 1918

1	S	
2	S	1st Sunday after Trinity First British Wireless Patent application lodged, 1896. Mr. Marconi lectured on "Radiotelegraphy" before Royal Institution, 1911.
3	M	KING GEORGE V. BORN, 1865. Lord Kelvin sent first paid Marconigram, 1898.
4	T	International Radiotelegraphic Conference opened, London, 1912.
5	W	Earl Kitchener drowned, 1916.
6	Th	Marconi made D.Sc. of Colombia University (U.S.A.), 1917. Radiotelegraph Act of Canada passed, 1913. Union of Sweden and Norway dissolved, 1905
7	F	
8	S	
9	S	2nd Sunday after Trinity Charles Dickens died, 1870.
10	M	S.s. "Slavonia" stranded off Azores, 1909. Passengers and crew saved.
11	T	
12	W	Sir Oliver Lodge born, 1851.
13	Th	Mr. Marconi lectured before Royal Institution on "Pro gress of Electric Space Telegraphy," 1902.
14	F	Flag Day, U.S.A.
15	S	Magna Charta, 1215.
16	S	3rd Sunday after Trinity
17	M	Sir W. Crookes born, 1832.
18	T	War with U.S.A., 1812. Waterloo, 1815.
19	W	"Alabama" sunk by "Kearsage," 1864.
20	Th	
21	F	
22	S	Summer Solstice.
23	S	4th Sunday after Trinity H.R.H. Prince of Wales born, 1894.
24	M	MIDSUMMER DAY.
25	T	
26	W	Lord Kelvin born, 1824; died December 17th, 1907.
27	Th	
28	F	Assassination of Archduke Francis Ferdinand at Sara- jevo, 1914.
29	S	Dr. Fleming's paper on "Oscillation Value of Wave Detectors for Wireless," 1917.
30	S	5th Sunday after Trinity Tower Bridge opened, 1894.

JULY, 1918

1	M	
2	T	
3	W	Sadowa, 1866.
4	Th	Contract between Marconi Co. and Admiralty made for equipment of ship and shore stations, 1900.
5	F	International Radiotelegraphic Convention signed London, 1912.
6	S	
7	S	6th Sunday after Trinity Georg Simon Ohm died, 1854 ; born March 16th, 1787.
8	M	
9	T	Conquest of German S.W. Africa, 1915. Administration of German wireless station at Sayville taken over by American Government, 1915.
10	W	
11	Th	Sir Wm. Robert Grove born, 1811 ; died, August 1st, 1896.
12	F	
13	S	Berlin Treaty, 1878.
14	S	7th Sunday after Trinity Bastille stormed, 1789. French Holiday.
15	M	Events of Kingstown Regatta reported by wireless, 1898.
16	T	
17	W	Wireless communication between ship and shore established up to 10 miles, 1897.
18	Th	
19	F	
20	S	Marconi's Wireless Telegraph Co., Ltd., formed, 1897.
21	S	8th Sunday after Trinity
22	M	
23	T	
24	W	Honorary G.C.V.O. conferred by the King on Senatore G. Marconi, 1914.
25	Th	
26	F	
27	S	Wireless Telegraphic Communication established between U.S.A. and Japan, 1915.
28	S	9th Sunday after Trinity Austria-Hungary declared war on Serbia, 1914. Wireless telephony from Arlington to Hawaii accomplished, 1915.
29	M	Dispersal of the Spanish Armada, 1588.
30	T	
31	W	TRINITY LAW SITTINGS END.

AUGUST, 1918

1	Th	LAMMAS DAY. Germany declared war on Russia, 1914. Germany sent ultimatum to Belgium, 1914.
2	F	
3	S	Germany declared war on France, 1914.
4	S	10th Sunday after Trinity Great Britain declared war on Germany, 1914. [1903. First International Wireless Conference met at Berlin, Suspension of Transatlantic Wireless Service, 1917.
5	M	BANK HOLIDAY. First British-American Cable worked, 1858.
6	T	
7	W	
8	Th	
9	F	Heligoland formally ceded to Germany, 1890.
10	S	Royal Observatory, Greenwich, founded, 1675. France declared war on Austria-Hungary, 1914.
11	S	11th Sunday after Trinity
12	M	Great Britain declared war on Austria-Hungary, 1914. Yap wireless station destroyed, 1914.
13	T	
14	W	Relief of Peking, 1900.
15	Th	Wireless Telegraph Act of Great Britain passed, 1904.
16	F	Robert Wilhelm Bunsen died, 1899 ; born March 31st, 1811.
17	S	
18	S	12th Sunday after Trinity
19	M	
20	T	Italy declared war on Turkey, 1915.
21	W	
22	Th	Wireless News Message Service to liners inaugurated, 1903.
23	F	Japan declared war on Germany, 1914.
24	S	Kamura (Togoland) wireless station destroyed by Germans, 1914.
25	S	13th Sunday after Trinity
26	M	
27	T	Roumania declared war on Austria-Hungary. 1916. Italy declared war on Germany, 1916.
28	W	Germany declared war on Roumania, 1916.
29	Th	Samoa Wireless Station captured, 1914.
30	F	Turkey declared war on Roumania, 1916.
31	S	Kandahar, 1880.

SEPTEMBER, 1918

1	S	14th Sunday after Trinity
2	M	Board of Trade (Great Britain) constituted, 1786.
3	T	
4	W	Proclamation of French Republic, 1870. S.s. "Hesperian" torpedoed, 1915.
5	Th	Malta taken, 1805.
6	F	"Mayflower" sailed, 1620. President McKinley shot, 1901.
7	S	
8	S	15th Sunday after Trinity Sir John Henniker Heaton, Bart., died, 1914; born, 1848.
9	M	Luigi Galvani born, 1737; died, December 4th, 1798.
10	T	
11	W	
12	Th	Herbertshohe (Neu Pommern) wireless station captured, 1914.
13	F	Quebec taken, 1759.
14	S	
15	S	16th Sunday after Trinity Liverpool and Manchester Railway opened, 1830.
16	M	
17	T	
18	W	Dr. Samuel Johnson born, 1709.
19	Th	
20	F	Poldhu Station masts wrecked, 1901.
21	S	
22	S	17th Sunday after Trinity Michael Faraday born, 1791; died, August 25th, 1867.
23	M	Autumnal Equinox.
24	T	
25	W	
26	Th	Contract made between Lloyd's and Marconi Co. for wireless equipment of ten of Lloyd's stations, 1901.
27	F	Duala (Cameroon) wireless station captured, 1914.
28	S	Strassburg capitulated, 1870.
29	S	18th Sunday after Trinity MICHAELMAS DAY. Marconi British Coast Stations taken over by Post Office, 1909.
30	M	Earl Roberts born, 1832; died, November 14th, 1914.

OCTOBER, 1918

1	T	
2	W	Major André hanged by Washington, 1780.
3	Th	International Radiotelegraphic Conference met at Berlin, 1906.
4	F	
5	S	Republic of Portugal proclaimed, 1910.
6	S	19th Sunday after Trinity
7	M	
8	T	Russian Marconi Company formed, 1908.
9	W	
10	Th	Panama Canal completed, 1913.
11	F	" Volturmo " burnt in Mid-Atlantic, 1913. Saved, 521.
12	S	America discovered, 1492. Robert Stephenson died, 1859. MICHAELMAS LAW SITTINGS BEGIN.
13	S	20th Sunday after Trinity First Aeroplane flight in U.S.A., 1893.
14	M	Great Britain declared war on Bulgaria, 1915.
15	T	The Gregorian Calendar introduced, 1582.
16	W	
17	Th	Wireless Transatlantic Public Service inaugurated, 1907.
18	F	
19	S	Italy declared war on Bulgaria, 1915.
20	S	21st Sunday after Trinity Battle of Navarino, 1827.
21	M	TRAFALGAR DAY. Death of Lord Nelson, 1805.
22	T	
23	W	Edouard Branly born, 1844. Order in Council established compulsory wireless on British vessels of 1,600 tons and upward.
24	Th	
25	F	
26	S	
27	S	22nd Sunday after Trinity Metz capitulated, 1870.
28	M	Present Royal Exchange opened, 1844.
29	T	George Morland, painter, died, 1804.
30	W	Admiral Lord Dundonald died, 1860.
31	Th	ALL HALLOWS EVE. Sir Joseph Wilson Swan born, 1828.

NOVEMBER, 1918

1	F	Marconi Wireless Telegraph Company of Canada formed, 1902.
2	S	
3	S	23rd Sunday after Trinity International Radiotelegraphic Convention, Berlin, signed, 1906.
4	M	
5	T	Great Britain declared war on Turkey, 1914.
6	W	Sir William Preece died, 1913; born, February 15th, 1834.
7	Th	Italian liner "Ancona" shelled and sunk, 1915.
8	F	John Milton died, 1674; born, 1608.
9	S	Kiauchau wireless station captured, 1914.
10	S	24th Sunday after Trinity Martin Luther born, 1483; died, February 18th, 1546.
11	M	MARTINMAS.
12	T	International Conference for Safety of Life at Sea opened, 1913.
13	W	Professor Clerk Maxwell born, 1831; died, November 5th, 1879.
14	Th	Death of Earl Roberts, 1914. Born, September 30th, 1832.
15	F	<i>Transatlantic Times</i> published at sea, 1899.
16	S	Inauguration of the Suez Canal, 1869.
17	S	25th Sunday after Trinity Hospital ship "Anglia" mined, 1915.
18	M	
19	T	Ferdinand de Lesseps born, 1805; died, December 7th, 1894.
20	W	
21	Th	Hospital ship "Britannic" torpedoed, 1916.
22	F	American Marconi Company formed, 1899.
23	S	
24	S	26th Sunday after Trinity Trials with wireless on trains in America, 1913.
25	M	Sir Isaac Newton born, 1642; died March 20th, 1727.
26	T	
27	W	
28	Th	Private ownership of wireless apparatus prohibited by British Parliament, 1914.
29	F	
30	S	William Gilbert died, November 30th, 1603; born, 1540.

DECEMBER, 1918

1	S	Advent Sunday Macquarie Island wireless station closed for period of war, 1915.
2	M	
3	T	
4	W	Luigi Galvani died, 1798 ; born, September 9th, 1737.
5	Th	
6	F	Dr. C. J. de Groot read important paper on " Classification and Elimination of Strays," 1917.
7	S	
8	S	2nd Sunday in Advent Falkland Islands Battle, 1914. John Milton born, 1608 ; died, November 8th, 1674.
9	M	Royal Academy instituted, 1768.
10	T	
11	W	Sir William Preece lectured on " Telegraphy Without Wires," Mr. Marconi conducting experiments, 1896.
12	Th	First wireless signals transmitted across the Atlantic, 1901.
13	F	" Delhi " disaster, 1911.
14	S	George Washington died, 1799 ; born, February 22nd, 1732.
15	S	3rd Sunday in Advent
16	M	Amundsen reached the South Pole, 1911.
17	T	First Transatlantic wireless message sent, 1902.
18	W	
19	Th	
20	F	
21	S	MICHAELMAS LAW SITTINGS END.
22	S	4th Sunday in Advent Winter Solstice.
23	M	
24	T	Wireless communication with East Goodwin light ship, 1898.
25	W	Christmas Day New Zealand liner " Matai " stranded at Raratonga. Crew, cargo and passengers saved by wireless.
26	Th	BANK HOLIDAY.
27	F	
28	S	
29	S	1st Sunday after Christmas S.s. " Persia " torpedoed, 1915.
30	M	Rudyard Kipling born, 1865.
31	T	Charter granted to East India Company, 1600.

JEWISH CALENDAR

(A.M. 5678 and part of A.M. 5679).

A.M. 5678.		A.D. 1917.		
Tishri	1	September	17	Rosh Hashanah (New Year).
"	3	"	19	Fast of Guedaliah.
"	10	"	26	Yom Kippur (Day of Atonement).
"	15	October	1	Feast of Tabernacles.
"	16	"	2	" " 2nd day.
"	21	"	7	Hosana Raba.
"	22	"	8	Feast of the 8th day.
"	23	"	9	Rejoicing of the Law.
Hesvan	1	"	17	New Moon.
Kislev	1	November	16	New Moon.
"	25	December	10	Hanuca, Dedication of the Temple.
Tebet	1	"	16	New Moon.
"	10	"	25	Fast. Siege of Jerusalem.
		A.D. 1918.		
Sebat	1	January	14	New Moon.
Adar	1	February	13	New Moon.
"	13	"	25	Fast of Esther.
"	14	"	26	Purim.
"	15	"	27	Shusan Purim.
Nisan	1	March	14	New Moon.
"	15	"	28	Festival of Passover.
"	16	"	29	" " 2nd day.
"	21	April	3	" " 7th day.
"	22	"	4	" " 8th day.
Iyar	1	"	13	New Moon.
Sivan	1	May	12	New Moon.
"	6	"	17	Pentecost. Festival of Weeks.
"	7	"	18	" 2nd day.
Tamuz	1	June	11	New Moon.
"	17	"	27	Fast of Tamuz.
Ab	1	July	10	New Moon.
"	9	"	18	Fast of Ab.
Elul	1	August	9	New Moon.

A.M. 5679.

Tishri	1	September	7	Rosh Hashanah (New Year).
"	2	"	8	" " 2nd day.
"	3	"	9	Fast of Guedaliah.
"	10	"	16	Yom Kippur (Day of Atonement).
"	15	"	21	Feast of Tabernacles.
"	16	"	22	" " 2nd day.
"	21	"	27	Hosana Raba.
"	22	"	28	Feast of the 8th day.
"	23	"	29	Rejoicing of the Law.
Hesvan	1	October	7	New Moon.
Kislev	1	November	5	New Moon.
"	25	"	29	Dedication of the Temple.
Tebet	1	December	4	New Moon.

NOTE.—All Jewish Sabbaths and Festivals begin the previous Evening at Sunset.

MOHAMMEDAN CALENDAR

(1336th Year of Hejira, A.D. 1917-18).

Year of Hejira		Year of Hejira	
1336.	A.D. 1917.	1336.	A.D. 1918.
Muharram	October 17	Ramadán	June 10
Saphar	November 16	Shawall	July 10
Rabia I.	December 15	Dulkaada	August 8
	A.D. 1918.	Dulheggia	September 7
Rabia II.	January 14		
Jomada I.	February 12	1337.	
Jomada II.	March 14	Muharram	October 7
Rajab	April 12	Saphar	November 6
Shaaban	May 12	Rabia I.	December 5

OLD STYLE CALENDAR, 1918.

(Used in Russia and the other Orthodox States.)

Old Style.		A.D. 1918.	A.M. 7426.	New Style.	
		Certain Holy Days.			
January	1	Circumcision		January	14
"	6	Theophany (Epiphany)		"	19
February	2	Hypapante		February	15
March	4	Carnival Sunday		March	17
"	9	Forty Martyrs		"	22
"	11	First Sunday in Lent		"	24
"	25	Annunciation of Theotokos		April	7
April	15	Palm Sunday		"	28
"	20	Great Friday		May	3
"	22	Holy Pasch (Easter Day)		"	5
"	23	St. George		"	6
May	9	St. Nicolas*		"	22
"	21	St. Constantine the Great		June	3
"	31	Ascension		"	13
June	10	Pentecost		"	23
"	11	Holy Ghost		"	24
"	30	Peter and Paul, Chief Apostles....		July	12
August	1	First day of Fast of Theotokos....		August	14
"	6	Transfiguration		"	19
"	15	Repose of Theotokos (Assumption)		"	28
"	30	St. Alexander (Nevsky)*		September	12
September	8	Nativity of Theotokos		"	21
"	14	Exaltation of the Cross		"	27
October	1	Patronage of Theotokos*		October	14
November	15	First day Fast of the Nativity....		November	28
"	21	Entrance of Theotokos		December	4
December	6	St. Nicolas		"	19
"	9	Conception of Theotokos		"	22
"	25	Nativity		January	7

* Peculiar to Russia.

1919 CALENDAR 1919

JANUARY.		FEBRUARY.		MARCH.	
S	— 5 12 19 26	S	— 2 9 16 23	S	— 2 9 16 23 30
M	— 6 13 20 27	M	— 3 10 17 24	M	— 3 10 17 24 31
Tu	— 7 14 21 28	Tu	— 4 11 18 25	Tu	— 4 11 18 25 —
W	1 8 15 22 29	W	— 5 12 19 26	W	— 5 12 19 26 —
Th	2 9 16 23 30	Th	— 6 13 20 27	Th	— 6 13 20 27 —
F	3 10 17 24 31	F	— 7 14 21 28	F	— 7 14 21 28 —
S	4 11 18 25 —	S	1 8 15 22 —	S	1 8 15 22 29 —
APRIL.		MAY.		JUNE.	
S	— 6 13 20 27	S	— 4 11 18 25	S	1 8 15 22 29
M	— 7 14 21 28	M	— 5 12 19 26	M	2 9 16 23 30
Tu	1 8 15 22 29	Tu	— 6 13 20 27	Tu	3 10 17 24 —
W	2 9 16 23 30	W	— 7 14 21 28	W	4 11 18 25 —
Th	3 10 17 24 —	Th	1 8 15 22 29	Th	5 12 19 26 —
F	4 11 18 25 —	F	2 9 16 23 30	F	6 13 20 27 —
S	5 12 19 26 —	S	3 10 17 24 31	S	7 14 21 28 —
JULY.		AUGUST.		SEPTEMBER.	
S	— 6 13 20 27	S	— 3 10 17 24 31	S	— 7 14 21 28
M	— 7 14 21 28	M	— 4 11 18 25 —	M	1 8 15 22 29
Tu	1 8 15 22 29	Tu	— 5 12 19 26 —	Tu	2 9 16 23 30
W	2 9 16 23 30	W	— 6 13 20 27 —	W	3 10 17 24 —
Th	3 10 17 24 31	Th	— 7 14 21 28 —	Th	4 11 18 25 —
F	4 11 18 25 —	F	1 8 15 22 29 —	F	5 12 19 26 —
S	5 12 19 26 —	S	2 9 16 23 30 —	S	6 13 20 27 —
OCTOBER.		NOVEMBER.		DECEMBER.	
S	— 5 12 19 26	S	— 2 9 16 23 30	S	— 7 14 21 28
M	— 6 13 20 27	M	— 3 10 17 24 —	M	1 8 15 22 29
Tu	— 7 14 21 28	Tu	— 4 11 18 25 —	Tu	2 9 16 23 30
W	1 8 15 22 29	W	— 5 12 19 26 —	W	3 10 17 24 31
Th	2 9 16 23 30	Th	— 6 13 20 27 —	Th	4 11 18 25 —
F	3 10 17 24 31	F	— 7 14 21 28 —	F	5 12 19 26 —
S	4 11 18 25 —	S	1 8 15 22 29 —	S	6 13 20 27 —

RECORD OF THE DEVELOPMENT OF WIRELESS TELEGRAPHY AND TELE- PHONY, AND INTERESTING ITEMS IN RELATION THERETO.

The record below is intended to constitute, arranged in chronological order, a résumé of the outstanding events in wireless telegraphy from year to year.

This is a feature which has figured in our YEAR BOOK from its initiation in 1913. The outstanding innovation introduced in this section of our current volume consists of the full account under the heading of 1917, whereto we desire to direct our readers' attention.

1831.

MICHAEL FARADAY discovered electro-magnetic induction between two entirely separate circuits.

1837.

The first patent for an electric telegraph taken out by Cooke and Wheatstone (London) and by Morse (U.S.A.).

1838.

K. A. Steinheil (Munich) discovered the use of the earth return, and suggested that the remaining metallic portion of the circuit might be dispensed with entirely, and a system of wireless telegraphy established.

1840.

Joseph Henry (U.S.A.) first produced high-frequency electric oscillations, and pointed out that the discharge of a condenser is oscillatory.

1842.

S. F. B. Morse made wireless experiments by electric conduction through water across Washington Canal and across wide rivers.

Joseph Henry noticed that a single electric spark about one inch long thrown into a circuit of wire in an upper room could magnetise steel needles included in a parallel circuit of wire placed in a cellar underground thirty feet below with two floors intervening. He was one of many observers prior to Hertz who had noticed curious effects due to electric sparks produced at a distance, which were commonly ascribed to ordinary electro-magnetic induction.

1843.

James Bowman Lindsay, of Dundee, suggested that if it were possible to provide stations not more than twenty miles apart all the way across the Atlantic, there would be no need to lay any cable.

1845.

Lindsay began making experiments across the River Tay, his method being to transmit messages by means of electricity or magnetism through and across the water without submerged wires, the water being utilised as the conducting medium.

1849.

Dr. O'Shaughnessy (afterwards Sir William O'Shaughnessy Brooke) succeeded in passing intelligible signals without any metallic conduction across the River Hooghly, 4,200 ft. wide, in India, but he found the cost of power prohibitive.

1859.

Bowman Lindsay gave a demonstration of his conduction system to the British Association Meeting, at which Michael Faraday and Sir William Thomson (afterwards Lord Kelvin) were both present. William H. Preece (afterwards Sir William) was deputed by the Electric Telegraph Company to report on Lindsay's system.

1862.

John Heyworth patented a method of conveying electric signals without the intervention of any continuous artificial conductor. Cromwell Varley tried this method, but found it a failure.

1867.

James Clerk Maxwell read a paper before the Royal Society, in which he laid down the theory of electro-magnetism, which he developed more fully in 1873, in his great treatise on electricity and magnetism. He predicted the existence of the electric waves that are now used in wireless telegraphy.

1870.

Von Bezold discovered that oscillations set up by a condenser discharge in a conductor give rise to interference phenomena.

1872.

Henry Highton made various experiments across the River Thames with Morse's method.

1879.

David E. Hughes discovered the phenomena on which depends the action of what was subsequently known as the coherer, which many years later were used in early electric-wave signalling. He found that a tube of metallic filings was sensitive to electric sparks made in its vicinity, and he was able to obtain such effects on a tube connected to a battery and a telephone at a distance of five hundred yards.

1880.

John Trowbridge, of Harvard, systematically studied the problem of propagation of electric current through "earth," either soil or water, and he found that signalling might be carried on over considerable distances by electric conduction through the earth or water between places not metallically connected.

1882.

Graham Bell experimented with Trowbridge's method on the Potomac River, when signals were detected at a distance of $1\frac{1}{2}$ miles.

Sir William H. Preece made an experiment, using Morse's method, to connect the Isle of Wight with the mainland across the Solent on two occasions during the failure of the submarine cable in the Solent.

1883.

Willoughby Smith, in a paper before the Institution of Civil Engineers, London, suggested that electric induction might be employed for railway signalling.

Heinrich Rudolph Hertz became *privat docent* at Kiel, where he began studies in Maxwell's electro-magnetic theory.

G. F. Fitzgerald suggested a method of producing electro-magnetic waves in space by the discharge of a condenser.

1885.

Thomas A. Edison, with the assistance of Messrs. Gilliland, Phelps, and W. Smith, worked out a system of communication between railway stations and moving trains by means of induction and without the use of conducting wires.

Sir W. H. Preece made experiments at Newcastle-on-Tyne which showed that in two completely insulated circuits of square form, each side being 440 yards, placed a quarter of a mile apart, telephonic speech was conveyed from one to the other by induction.

1886.

A. E. Dolbear, of Tuft's College, Boston, patented a plan for establishing wireless communication by means of two insulated elevated plates, but there is no evidence that the method proposed by him did, or could, effect the transmission of signals between stations separated by any distance.

1887.

Heinrich Rudolph Hertz discovered the progressive propagation of electro-magnetic action through space, and was able to measure the length and velocity of electro-magnetic waves, and to show that in the transverse nature of their vibration, and their susceptibility to refraction and polarisation, they are in complete accordance with the waves of light and heat.

Hertz employed as a detector of the electric wave a simple nearly-closed circuit of wire, called the "Hertz Resonator," but it was subsequently discovered that the metallic microphone of Hughes was a far more sensitive detector.

A. W. Heaviside established communication by telephonic speech between the surface of the earth and the subterranean galleries of the Broomhill Collieries, 350 ft. deep, by laying above and below ground two complete metallic circuits, each about $2\frac{1}{4}$ miles in length, and parallel to each other.

1889.

Elihu Thompson suggested that electric waves were particularly suitable for the transmission of signals through fogs and material objects.

1891.

John Trowbridge suggested that by means of magnetic induction between two separate and completely insulated circuits communication could be effected between distances.

1892.

Edouard Branly devised an appliance for detecting electro-magnetic waves, which was known as a "coherer." He discovered that these waves had the power of affecting the electric conductivity of materials when in the state of a powder.

Sir W. H. Preece adopted a method which united both conduction and induction as the means of affecting one circuit by the current in another. In this way he established communication between two points on the Bristol Channel, and at Lochness, in Scotland.

C. A. Stevenson, of the Northern Lighthouse Board, Edinburgh, advocated the use of an inductive system for communication between the mainland and isolated lighthouses.

1894.

E. Rathenau, of Berlin, experimented with a conductive system of wireless telegraphy, and signalled through three miles of water.

1895.

Mr. G. Marconi's investigations led him to the conclusion that Hertzian waves could be used for telegraphing without wires, and he made important experiments at his father's home in Italy.

Willoughby Smith established communication by conduction with the lighthouse on the Fastnet.

1896.

In February Mr. Marconi came to England, and on June 2nd lodged his application for the first British Patent for Wireless Telegraphy, No. 12,039 of 1896.

In July of that year he was introduced to Sir William H. Preece, the Chief Electrical Engineer of the Post Office, at whose request Mr. Marconi conducted experiments over a distance of about 100 yards before the officials of the Post Office. Shortly afterwards a further series of trials was conducted by Mr. Marconi on Salisbury Plain, when communication was successfully established over a distance of $1\frac{3}{4}$ miles.

On December 11th, 1896, Sir William H. Preece lectured on "Telegraphy without Wires," Mr. Marconi conducting the experiments.

1897.

In March, 1897, Mr. Marconi demonstrated before the representatives of various Government Departments, communication being established over a distance of 4 miles.

In May further trials were made between Lavernock and Flatholm, a distance of over three miles; and on the 13th of that month the late Professor Slaby was present at further trials, when communication was established over a distance of about 8 miles.

In July Mr. Marconi gave a demonstration of his invention at the Admiralty in Rome, and before King Humbert at the Royal Palace of the Quirinal. Between July 10th and 18th trials were made at Spezia, and on the 17th and 18th communication was maintained between the shore and the Italian cruiser *San Martin* at sea, at distances up to 10 miles.

On July 20th, 1897, the Wireless Telegraph and Signal Company, Limited, was incorporated, with a capital of £100,000, to acquire Mr. Marconi's patents in all countries except Italy and dependencies.

On August 27th, 1897, the late Professor Slaby lectured on Wireless Telegraphy at the Sailors' Home, Potsdam, before the German Emperor and Empress and the King of Spain.

In September and October Mr. Marconi further experimented on Salisbury Plain. Trials were also made by officials of the Post Office at Dover. Apparatus was erected at Bath, and signals received from Salisbury, 34 miles away.

The first Marconi station was erected at the Needles, Isle of Wight,

in November, and experiments conducted between that station and Bournemouth, a distance of $14\frac{1}{2}$ miles.

In December, in the presence of Captain Kennedy, R.E., tests were made between the Needles station and a steamer, readable signals being received up to a distance of 18 miles.

1898.

In May, 1898, Mr. Marconi experimented between St. Thomas's Hospital and the House of Commons. In the same month experiments were carried out between Ballycastle and Rathlin Island, a distance of $7\frac{1}{2}$ miles.

On June 3rd Lord Kelvin visited the Needles station and sent from there the first paid marconigram.

On July 20th and 22nd the events of the Kingstown Regatta were reported by wireless telegraphy, for the *Dublin Daily Express*, from the steamer *Flying Huntress*, equipped with Marconi apparatus.

On August 3rd wireless telegraphic communication was established between the Royal yacht *Osborne* and Ladywood Cottage, Osborne, in order that Queen Victoria might communicate with the then Prince of Wales. Constant and uninterrupted communication was maintained during the sixteen days the system was in use.

In September the installation at Bournemouth was removed to Poole Harbour, Dorset.

By arrangement with Trinity House, wireless apparatus was installed in December, 1898, on the East Goodwin Lightship and at the South Foreland Lighthouse, the intervening distance being 12 miles.

1899.

During a gale in January, 1899, the East Goodwin Lightship was damaged, and the mishap reported by wireless telegraphy to Trinity House.

On March 2nd Mr. Marconi read a paper on Wireless Telegraphy at the Institution of Electrical Engineers.

On March 3rd the s.s. *R. F. Matthews* ran into the East Goodwin Lightship. The accident was reported by wireless telegraphy to the South Foreland Lighthouse, and assistance was promptly sent.

On March 27th communication was established between Wimereux, near Boulogne, and the South Foreland Lighthouse.

During the naval manœuvres in July three British warships, equipped with Marconi apparatus, correctly interchanged messages at distances up to 74 nautical miles (about 85 land miles).

In September Marconi Stations were installed at Chelmsford and Dovercourt.

During the meetings of the British Association at Dover and of the Association Française pour l'Avancement de Science at Boulogne, in August, communication was maintained by means of apparatus installed at the Dover Town Hall and at Wimereux.

The international yacht races which took place in September and October were reported by wireless telegraphy for the *New York Herald*. At the conclusion of the races, series of trials were made between the United States cruiser *New York* and the battleship *Massachusetts*, signals being exchanged between the vessels at distances up to about 36 miles. On the return journey from America Mr. Marconi fitted the s.s. *St. Paul* with his apparatus, and on November 15th established communication with the Needles Station when 36 miles away. Reports of the progress of the war in South Africa were telegraphed to the vessel, and published in a leaflet entitled "The Transatlantic Times," printed on board.

In October the War Office adopted Marconi apparatus for use in the field in South Africa, and on November 2nd six electricians left for South Africa with sets of apparatus. These proved of considerable service to the army and the navy, to which latter they were subsequently transferred.

On November 22nd the Marconi Wireless Telegraph Company of America was formed for the purpose of exploiting Marconi patents in the United States of America and possessions.

1900.

On February 2nd Mr. Marconi delivered a discourse on Wireless Telegraphy at the Royal Institution.

In March the Marconi system was adopted by the Norddeutscher Lloyd Steamship Co., and apparatus installed on the Borkum Riff Light-ship, Borkum Lighthouse, and *Kaiser Wilhelm der Grosse*.

On April 25th the Marconi International Marine Communication Company was incorporated, with offices in London and Brussels, and agencies in Paris and Rome, for the maritime working of the Marconi system.

On July 4th a contract was made with the British Admiralty for the installation of apparatus on twenty-six of His Majesty's ships and six Admiralty coast stations.

In October the erection of the High Power Station at Poldhu was commenced. The aerials were supported by 20 masts, each 210 ft. high.

In November the first wireless telegraph station in Belgium was installed at La Panne.

1901.

On January 1st the barque *Medora* was reported by wireless as waterlogged on Ratel Bank. Assistance was immediately sent.

On January 8th wireless telegraph experiments on the *Princesse Clémentine* were carried out during a storm, communication being main-

tained the whole way from Ostend to Dover. On January 19th *Princesse Clémentine* ran ashore, and news of the accident was telegraphed to Ostend by wireless.

In February communication was established between Niton Station, Isle of Wight, and the Lizard Station, a distance of 196 miles.

On March 1st a public Wireless Telegraph Service was inaugurated between the five principal islands of the Hawaiian group, viz., Oahu, Kauai, Molaki, Maui, and Hawaii.

In April communication was successfully established and maintained between a station at Calvi, Corsica, and another at Antibes, in the Riviera.

On May 15th, 1901, Mr. Marconi read a paper on Syntonic Wireless Telegraphy at the Royal Society of Arts, London.

The first British ship, the s.s. *Lake Champlain*, was equipped with wireless telegraphic apparatus on May 21st. About the same date coast stations in England and Ireland were opened for communication with ships at sea as follows:—Crookhaven, Co. Cork; Rosslare, Co. Wexford; Holyhead; Caister, near Yarmouth; North Foreland.

The masts at Poldhu were wrecked during a very heavy gale on September 20th, and the masts at Cape Cod shared a like fate in the November following. The masts were then replaced by four towers, 210 ft. high, built of timber.

On September 26th a 14 years' contract was made for the installation of wireless apparatus at ten of Lloyd's Signal Stations.

The Compagnie de Télégraphie sans Fil of Brussels was formed on October 26th, to develop and work the Marconi system on the Continent.

On December 12th and 13th signals were received by Mr. Marconi at St. John's, Newfoundland, from Poldhu station, Cornwall, a distance of 1,800 miles.

1902.

In February Mr. Marconi received on board the s.s. *Philadelphia* readable messages up to a distance of $1,551\frac{1}{2}$ statute miles, and signals up to a distance of 2,099 statute miles from Poldhu Station, Cornwall.

Mr. Marconi lectured on the "Progress of Electric Space Telegraphy" at the Royal Institution of Great Britain on June 13th.

On July 14th-16th Mr. Marconi received messages from Poldhu on the Italian battleship *Carlo Alberto*, lying at Cape Skagen, a distance of 800 miles; and at Kronstadt, 1,600 miles.

The Colonial Premiers who were in England for King Edward's coronation witnessed a demonstration of Mr. Marconi's invention on board the *Koh-i-noor*.

The Marconi Wireless Telegraph Company of Canada was formed on November 1st, and in December wireless messages were despatched by the Cape Breton Station from Mr. Marconi and from the Earl Minto to His Majesty King Edward VII. Mr. Marconi also sent a message

to King Victor of Italy. Mr. Marconi was made a member of the Italian Order of Merit.

1903.

President Roosevelt sent a Transatlantic message to King Edward VII. *viâ* Cape Cod and Poldhu Stations on January 19th. High-power and other stations were ordered by the Italian Government, and the Italian Senate and Chamber of Deputies tendered a vote of thanks to Mr. Marconi for the results obtained with wireless telegraphy.

The first Transatlantic marconigram was published in *The Times* on March 30th.

On April 5th the first licence for the erection of an Italian high-power station was granted.

The Compagnie Française Maritime et Coloniale de Télégraphie Sans Fil was formed on April 24th to exploit the Marconi system in France.

An agreement was made on July 24th by the British Admiralty for the general use of the Marconi system in the Navy.

The first International Conference on Wireless Telegraphy was held in Berlin on August 4th.

On August 22nd a wireless telegraphic service of news to ships at sea was inaugurated.

The passengers of the Red Star liner *Kroonland*, which was disabled on December 8th, 130 miles west of the Fastnet, were saved great inconvenience by wireless communication being established with the Crookhaven Station.

Mr. Marconi was made a Knight of the Order of St. Anne of Russia.

1904.

Meteorological information was supplied by wireless to the *Daily Telegraph*.

Accidents to s.s. *New York* and the s.s. *Friesland* early in the year were reported by wireless telegraphy.

1905.

Judgment given by Judge Townsend in New York on May 4th in favour of the Marconi Company in its action against the De Forest Wireless Telegraph Company for infringement of patents.

On May 12th the Canadian Government ordered stations for Cape Sable (N.S.) and St. John (N.B.), and on May 30th instructions were given for five more lightships to be installed with wireless apparatus for Trinity House.

Erection of the Clifden High-Power Station (Ireland) was commenced in October.

Mr. Marconi was made a Civil Member of the Royal Order of Savoy.

In 1905 Mr. Marconi took out his patent for the horizontal directional aerial (No. 14,788), which marked a step of great importance in the progress of long-distance work.

1906.

In May a contract was entered into between the British Post Office and the Marconi Company whereby the latter was charged with the erection of wireless stations at Tobermory and Loch Boisdale, Scotland.

On August 4th the Argentine Marconi Company was formed to work Marconi patents in Argentina and Uruguay.

In October and November an International Radiotelegraphic Conference was held at Berlin, and a convention signed by most of the countries of the world.

1907.

Marconi Transatlantic Stations at Clifden, Ireland, and Glace Bay, (Nova Scotia) were opened for limited public service on October 17th.

1908.

On February 3rd transatlantic stations were opened to the general public for transmission of messages between the United Kingdom and the principal towns in Canada.

Mr. Marconi lectured on "The Commercial Application of Wireless Telegraphy" at Liverpool, on February 24th.

The Russian Company of Wireless Telegraphs and Telephones was formed on October 8th.

1909.

The *Republic*, after collision with the s.s. *Florida* off the coast of the United States on January 23rd, succeeded in calling assistance by wireless, with the result that all her passengers and crew were saved before the vessel sank.

Mr. Marconi lectured before the Dutch Royal Institute of Engineers in May and in December.

The Marconi British coast stations were taken over by the Postmaster-General on September 29th, who was granted a licence to use the company's patents.

In December Mr. Marconi lectured at the Royal Academy of Science, Stockholm, and (with Prof. Braun) was awarded the Nobel Prize for Physics.

1910.

Mr. Marconi, *en route* for Buenos Aires on board the *Principessa Mafalda*, received messages from Clifden at a distance of 4,000 miles by day and 6,735 miles by night.

The *Compania Nacional de Telegrafia sin Hilos* was formed on December 24th to exploit the Marconi system in Spain.

1911.

On February 21st judgment was given in the action instituted in December, 1910, by the Marconi Company against the British Radiotelegraph and Telephone Company for infringement of their tuning patent No. 7777 of 1900. Mr. Justice Parker's decision was in favour of the Marconi Company, and he granted them a certificate of validity of their patent and an injunction, together with costs and damages.

A contract was made between the Marconi Company and the Canadian Government for operating wireless telegraph stations in Canada for a period of 20 years.

Stations at Teneriffe, Cadiz, Barcelona, and Las Palmas were opened for public business by the *Compania Nacional de Telegrafia sin Hilos*, the *cessionnaires* of the public wireless telegraph service of Spain.

The Imperial Conference held in May approved the proposal that an Imperial Wireless Telegraph system should be created.

Mr. Marconi lectured on "Radiotelegraphy" at Royal Institution on June 2nd.

The Lodge-Muirhead patents were acquired by the Marconi Company, and Sir Oliver Lodge became a scientific adviser to the company.

1912.

Early in the year the American Marconi Company absorbed the United Wireless Company of the United States.

On January 27th the central station of the Spanish wireless service (Aranjuez) was opened by King Alfonso XIII.

In February the Marconi Company secured the patents of Bellini and Tosi, including those for the wireless direction-finder.

On April 15th the s.s. *Titanic* struck an iceberg and sank, but, owing to the prompt wireless call for assistance, the lives of more than 700 of her passengers were saved.

Mr. Marconi, whilst in America, delivered an address on the "Progress of Wireless Telegraphy" before the New York Electrical Society, on April 17th.

The International Radiotelegraphic Conference, opened in London on June 4th, approved important regulations to secure uniformity of practice in wireless telegraphic services.

The British Government entered into a contract in July with the Marconi Company for the erection of a chain of high-power Wireless Telegraph stations, as recommended at the Imperial Conference held in 1911.

The Marconi Wireless Telegraph Company of Canada was entrusted by the Dominion Government on September 17th with the working of the existing stations on the Great Lakes until 1931, and also with the erection of further stations. A similar arrangement was made in December with the Newfoundland Government for stations at Belle Isle, and on the Labrador coast.

Mr. Marconi was decorated with the Grand Cross of the Order of Alfonso XII., and made a Grand Officer of the Order of St. Maurice and Lazarus.

1913.

During this year the Governments of France and the United States experimented between the Eiffel Tower station and Washington by wireless, in securing exact data for comparing the velocity of grounded electro-magnetic waves to that of light.

In January the High Court of Justice of France delivered a judgment declaring the validity of all claims of the Marconi patent 305060, which corresponds with the "four sevens" patent.

On January 23rd the Postmaster-General appointed a committee "To consider and report on the merits of the existing systems of long-distance wireless telegraphy, and in particular as to their capacity for continuous communication for the distances required by the Imperial Chain." The Committee reported that "The Marconi system is at present the only system of which it can be said with any certainty that it is capable of fulfilling the requirements of the Imperial Chain."

As a result of the official enquiry into the loss of the *Titanic*, the *Scotia*, equipped with a Marconi wireless installation, left Dundee on March 8th to patrol the waters of the North Atlantic and to collect information regarding the movement of ice.

In June a Wireless Telegraph Bill was presented to the Ottawa Parliament, and passed under the title: "Radiotelegraph Act of Canada."

On October 11th the *Volturmo* was burnt in mid-Atlantic, and in response to the wireless appeal ten vessels came to the rescue, 521 lives being saved.

The Wireless Society of London was formed in October.

On November 12th an International Conference for the purpose of considering means of saving life at sea was opened in London by the President of the Board of Trade.

On November 24th the first practical trials with wireless apparatus on trains were made on a train belonging to the Delaware, Lackawanna and Western Railroad of America.

On November 25th Commander H. A. Edwards, who was at the head of the Bolivian Survey Commission, reported that the Commission had been able to determine the difference of longitude between the Brazilian towns Mañaos and Porto Velho by means of wireless signals.

Dr. Mawson, whilst exploring in Antarctica, was enabled by means of wireless to keep in touch with the outer world through the station on Macquarie Island.

During his expedition to Central Asia in 1913, Dr. Filippo de Filippi, the Italian explorer, frequently determined his longitude by means of wireless time signals transmitted from Lahore.

1914.

On January 20th the Safety of Life at Sea Convention, drawn up by the International Conference which met on November 14th, 1913, was signed at London. That section of the Convention which deals with Wireless Telegraphy lays down the minimum wireless telegraphy equipment to be carried by vessels of different grades.

Early in the year an International Wireless Conference met at Brussels. The object of the Conference was to adopt a programme whereby careful observations could be taken with a view to arriving at some practical explanation of the laws governing the variation in the strength of wireless signals.

During the early part of March Mr. Marconi joined one of the Italian war vessels attached to the squadron commanded by the Duke of Abruzzi. Experiments in wireless telephony were carried out between several vessels lying at anchor $\frac{5}{8}$ mile apart, ordinary receivers being used with great success. The wireless telephone experiments were continued between two warships on the high seas, and the reception was consistently perfect over a distance of $18\frac{1}{2}$ miles. Later successful wireless telephone communications were effected, using only very limited energy between vessels on the high seas 70 km. (44 miles) apart. These experiments were repeated where land intervened between the communicating vessels, and in this case again excellent results were obtained. On this day radiotelephonic communication was constantly maintained for twelve hours.

This year saw the first practical application of wireless to lifeboats belonging to large ocean steamships, the Marconi Company having designed a special type of apparatus for this purpose.

On April 12th the Council of the Royal Society of Arts presented the Society's Albert Medal to Mr. Marconi for his services in the development and practical application of wireless telegraphy.

On April 15th, at Godalming, a memorial was unveiled to the memory of Jack Phillips, chief wireless telegraphist of the ill-fated *Titanic*, who "died at his post when the vessel foundered in mid-Atlantic on the 15th day of April 1912."

On May 29th the s.s. *Empress of Ireland* foundered after a collision with the Norwegian collier *Storstad*, and over 500 people were saved

On June 8th a report was issued by the Committee appointed by the Postmaster-General to consider how far and by what methods the State should make provision for research work in Wireless Telegraphy. This report recommends (1) that the Government should establish a National Committee for Telegraphic Research which would promote in the public interest, both by theoretical investigation and by experiment, the progress of scientific telegraphy and telephony, and (2) that the Government should establish a National Research Laboratory, with a special scientific staff to undertake, under the direction of the Committee, and on the lines laid down in this report, telegraphic investigation, the results of which should be available for all departments of the public service.

In June important tests were made with the Marconi-Bellini-Tosi wireless direction finder on board the s.s. *Royal George*. During a voyage from Bristol to Montreal the liner, even in the thickest weather and without the aid of compass or sextant, was enabled to find her position when within a radius of about fifty miles of a land wireless station.

On July 24th the King conferred upon Mr. Marconi the Honorary Knighthood of the Grand Cross of the Victorian Order.

On July 24 judgment for plaintiffs was delivered in an action brought by the Marconi Company against the Helsby Wireless Telegraph Company, Limited, for infringement of patent 7777 of 1900.

War was declared by Great Britain on August 4th and all *private* radiotelegraphy was suspended. From this point, therefore, our record is necessarily incomplete, and the *lacunæ* must await attention until the close of hostilities.

On August 9th the wireless station at Dar-es-Salaam, German East Africa, was announced to have been destroyed by the British.

The German station at Yap, Caroline Islands, was destroyed on August 12th.

On August 24th the Germans blew up the giant station at Kamina, Togoland, to prevent its falling into the hands of the British.

On August 24th the United States Government notified the owners of the German Transatlantic station at Tuckerton, New Jersey, that its experimental licence had expired, and it must therefore close down. Arrangements were afterwards made for restricted working.

On August 29th the German wireless station at Samoa was captured by an Australian Naval Force.

The German station at Nauru, Marshall Islands, was captured shortly after this.

On September 12th an Australian Naval Reserve Force captured the German wireless station at Herbertshohe on the island of Neu Pommern.

The powerful German station at Duala, Cameroons, was seized on September 27th.

On November 9th a Japanese force occupied Kiauchau and its wireless station.

On November 13th the Marconi Wireless Telegraph Company of America obtained a preliminary injunction against the De Forest Radio Telephone and Telegraph Company and the Standard Oil Company in a suit for infringement of patent.

On November 28th the following notice, under the Defence of the Realm (Consolidation) Regulations 1914 was issued: "No person shall, without the written permission of the Postmaster-General, buy, sell, or have in his possession or under his control any apparatus for the sending or receiving of messages by wireless telegraphy, or any apparatus intended to be used as a component part of such apparatus."

During the year high-power trans-oceanic stations were completed at Carnarvon (Wales), Belmar, New Jersey (U.S.A.), Honolulu (Hawaiian Islands), and San Francisco (Cal.). The Honolulu and San Francisco stations were formally opened to public service on September 24th.

1915.

In January Senatore Marconi took his seat in the Italian Senate.

On February 20th the Panama-Pacific Exhibition at San Francisco was officially opened by President Wilson at Washington, through the medium of wireless telegraphy.

A wireless telegraph service between Spain and Italy was inaugurated on May 1st.

On May 12th the German high-power wireless station at Windhoek was captured by a South African force.

On May 12th, in Battery Park, New York, the Mayor of New York unveiled the monument in memory of wireless operators who had lost their lives at the post of duty.

On July 8th, as a result of investigations into alleged breaches of neutrality, the United States Government decided to take over the control of the Telefunken wireless station at Sayville, Long Island.

At the end of August the submarine cable between Oban and south-east Mull broke, and until its repair wireless telegraphy formed the only means of communication between the outlying islands and the mainland.

At the annual meeting of Marconi's Wireless Telegraph Company on July 26th Mr. Godfrey Isaacs announced the complete destruction of the German wireless chain, upon which our enemy had expended so much money, and on which they based their high hopes of a commercial world-domination.

On July 27th wireless communication between the United States and Japan was effected. The two terminal stations were situated at San Francisco and Funabashi, near Tokio, and the messages were relayed through Honolulu.

At the British Association meeting, held in September, three papers on wireless telegraphy were read, the first, by Dr. W. H. Eccles and Mr. A. J. Makower, was entitled "Electric Oscillations in Couple Circuits—A Class of Particular Cases." The second paper, by Professor G. W. O. Howe, dealt with "The Capacity of Aerials of the Umbrella Type." The final paper was entitled "A Note on Earth Resistance," and came from Professor E. W. Marchant.

On September 28th the American Telephone and Telegraph Company, working in conjunction with the Western Electric Company, succeeded in telephoning by wireless across the American Continent from Arlington to Hawaii, a distance of nearly 5,000 miles.

In September a commercial wireless service was inaugurated between Japan and foreign countries via Ochushi and Petropavlovsk, in Siberia.

On October 26th the wireless telephone experiments were continued, communication being effected across the Atlantic from Arlington to the Eiffel Tower, Paris.

In November Mr. Daniels, United States Secretary of the Navy, successfully transmitted from Washington a wireless telephonic naval order to Rear-Admiral Usher at Brooklyn Naval Yard.

1916.

In January, by an Order in Council, His Britannic Majesty prohibited to all destinations the export of material for wireless telegraphs and telephones.

In February the Pope, restoring an ancient custom of the Church, announced his intention of officially blessing wireless telegraphy in recognition of its services to mankind.

During the course of a severe blizzard in the United States during February wireless telegraphy was extensively used for train despatching, as the telegraph wires had been destroyed.

In the early part of the year wireless enthusiasts in Holland formed a wireless association, "The Nederlandsche Vereeniging voor Radio-Telegraphie," with headquarters at The Hague.

During the Irish rebellion at Easter in this year wireless telegraphy played an important part, as the insurgents had entirely isolated Ireland by cutting the cable to England.

Among the subjects discussed at the Pan-American Conference held at Buenos Aires in April last was the control of wireless telegraphy. This forms a big step forward on the part of the South American Republics, clearly proving their appreciation of the necessity of a reliable wireless telegraphic service.

The determination of the difference in longitude between Paris and Washington with the aid of wireless telegraphy, which has been in progress since October, 1913, was completed in May, the result,

expressed in terms of time, being 5 hours 17 minutes 35·67 seconds, and has a probable accuracy of the order of '01 second.

On July 28th the *London Gazette* printed the text of a new official regulation requiring the owner of every vessel of 3,000 tons or over registered at a British port in the United Kingdom to take out a licence for a wireless installation before August 21st, 1916, irrespective of whether his ship carries passengers or not.

On September 20th, Judge Mayer, of the U.S.A. District Court, delivered an important decision regarding the suit tried before him, affecting the patents involved in the Fleming-Vale controversy, between the American Company and the De Forest Radio Telegraph and Telephony Company. He gave his decision in favour of the former, and his judgment has been pronounced to constitute one of the finest and most technically correct opinions ever delivered from the American Bench.

On November 12th, Senatore Marconi delivered an important lecture at the Lincei Academy, Rome, before H.R.H. the Duke of Genoa, and a most distinguished audience. He took as his subject those problems of Radiotelegraphy to which scientists are likely to direct their attention in the immediate future.

The initiation of the newly-established Trans-Pacific Wireless Service between the U.S. and Japan was celebrated on Wednesday, November 5th, by an interchange of messages between the Mikado and President Wilson. Whilst the world's greatest war has been raging with unabated fury in Europe this new enterprise, carried out by the Marconi Company, demonstrates the progress of wireless communication in zones wherein men are unobsessed by preoccupation in mutual destruction.

1917.

"*Coming of Age.*"—In June of this year wireless telegraphy "came of age"—i.e., 21 years had elapsed since the registration of patent 12,039 on June 2nd, 1896. This constitutes the basic patent of the Marconi system, from which all the other so-called systems have radiated. Eminent radiotelegraphists like Dr. J. A. Fleming and Professor E. W. Marchant paid a tribute to the occasion by reviewing the past and forecasting the future. Mr. F. S. Stacey, the first British wireless operator to make a transatlantic voyage, contributed an illustrated article to the *Wireless World*, detailing his experiences on that initial crossing, together with a description of his apparatus.

Wireless and Aircraft.—During this the fourth year of war considerable developments have taken place in regard to wireless as utilised for military and naval purposes. Into the greater number thereof it is not possible to enter into detail, but one outstanding feature has come into sufficient prominence for its presence to be irrepressible by Press censorship. We refer to the connection between aircraft and wireless, which has become so pronounced as to justify the title which is sometimes given them of the "Gemini of modern war."



HISTORICAL APPARATUS (I.).

- A. TWISTED STRIP AMMETER FROM THE LATE MR. DUDDELL'S LABORATORY.
- B. THERMO-GALVANOMETER USED BY THE INVENTOR.

[To face page 32.]

The great expansion of aeronautics has necessitated a most insistent call for instruction in wireless telegraphy. This appeal formed part of the important message to the wireless men of America, issued by Senatore Marconi on the occasion of his visit to the U.S.A. The close connection between aircraft and wireless constituted a prominent feature in the great pan-American aeronautic expansion, held in the course of 1917, under the auspices of the Aero Club of America, at the Grand Central Palace, New York. A significant item in this connection occurred amongst the details of the new four-engined German Gothas, which was allowed to be published in the British Press. According to this account the captaincy of these huge aeroplanes is vested in the wireless man.

Compulsory Wireless.—The year 1917 saw a further development in the direction of compulsory wireless for sea-going vessels. As recorded in our notes for 1916, on July 28th of that year the British Government made it *de rigueur* for every British-owned vessel of 3,000 tons or over to take out a licence for a wireless installation. These measures are regulated by Orders in Council issued under the Defence of the Realm Act Regulation. No. 37 under that Act, together with those numbered 37A, 37B, and 37C, all refer to these various new measures; of these 37B, the one mentioned above, refers specifically to radiotelegraphy. A further amendment was introduced in the course of 1917 bringing the tonnage limit down to 1,600 tons gross. This new clause enacted that every British sea-going ship of such tonnage or upwards, in respect of which a licence to instal wireless telegraph apparatus has been granted by the Postmaster-General, shall be so equipped and provided with two certified operators, who must be suitably accommodated.

Rescue Work in Hospital Ships.—The closing months of 1916 and the opening of 1917 witnessed the outbreak of an epidemic of attacks on hospital ships by U boats. Outstanding instances consist of the ex-White Star liner *Britannic*, the Union-Castle Company's steamer *Braemar Castle*, the R.M.S.P. *Asturias*, and others. Some of them contained a full complement of wounded on board, and the SOS calls for help radiated from their aeriels enabled the toll paid by the unhappy and helpless victims of "man's inhumanity to man" to be immensely less than it would otherwise have proved. The International Red Cross Committee, whose headquarters are located at Geneva, in vain addressed a protest to the German Government on the subject.

The Spanish Government intervened, and the enemy undertook to respect vessels which carried Spanish officers as a guarantee against any alleged conveying of troops, ammunition, etc. This agreement was, however, violated towards the close of the year by the torpedoing of further vessels, despite their having carried out the stipulated arrangements.

Fresh Fields for Wireless.—The extension of radiotelegraphy to "women's sphere" became quite a feature of the year 1917 in the U.S.A. A woman's division of the National Amateur Wireless Association was formed in New York for war-time instruction, the first class of

twenty-five convening at Hunter College, New York City, on March 12th, 1917.

The police of New York have installed wireless apparatus and are utilising its services both ashore and afloat. Commissioner Woods, of New York, pronounced the city's police wireless system a demonstrated success in a public statement issued in June, 1917.

The utility of wireless to lighthouses, lightships, etc., has been extended through the installation by the U.S. Naval Communication Service in October, 1917, of a radiophone fog-warning device near Newport (Rhode Island).

Ubiquitous Expansion.—Wireless activities have been going on apace all over the world throughout the twelve months under review, although it is not permissible to speak of the action of the British authorities, even in cases so remotely affected by military considerations as South and Central America.

Tests of Marconi's timed spark for continuous wave generation were carried out on January 29th and 30th, 1917, between the United Kingdom and the U.S.A.

Valuable data on the use of portable wireless equipment in the tropics was secured by an American scientific expedition, under the direction of Dr. Alexander Hamilton Rice, explorer, which penetrated 2,100 miles up the Amazon River in February, 1917.

Australasia and the Pacific.—Active wireless development has been going on in Australasia and the Pacific. Wireless communication has been opened up with Tulagi (Solomon Islands) and with Ocean Island (Gilbert group). Hitherto merchants and traders have found their activities in these waters severely handicapped by lack of prompt communication.

United States.—The United States having now entered the arena of war naturally fall into line with other belligerent Powers in seeking to conceal from their common opponents the specific measures taken to develop their resources. In their case, however, the energy displayed in wireless directions has received the same war-quickenings as has been the case with the rest of us. Before joining the battle line, on February 4th, 1917, the American Government took possession of the wireless station at Sayville, Long Island, which had previously been controlled by German interests. They (also in pre-war days) announced the opening of a station at San Diego, just north of the Mexican border. This constitutes a third link in a chain of five wireless stations for the U.S. Navy, joining up the American possessions with Washington.

A new station was opened at Cape May (New Jersey) on March 12th, 1917, about a mile from the old installation and half a mile from the point of Cape May.

The wireless station of the *New York Herald*, re-equipped by the Marconi Wireless Telegraph Company of America, was once more in a position to resume operations on February 28th, 1917.

The Circuit Court of Appeals, New York City, on May 8th, 1917, confirmed the decision of Judge Mayer (reprinted in the YEAR BOOK for 1917) that the De Forest "audion" was an infringement of the Fleming valve; and handed down an unanimous opinion in favour of the Marconi Wireless Telegraph Company of America.

Marconi in America.—The visit of Senatore Marconi to the United States, although he went primarily on a patriotic mission for his country, produced a stimulating effect upon recruiting for wireless in the great republic overseas. The eminent Italian spoke much more freely than is his wont, both with regard to the past and future. He detailed the way in which wireless on aeroplanes multiplies manifold the effect of heavy artillery, and stated that it had practically taken over all the burden of communication in front line trenches. Although of opinion that the wireless telephone is far from attaining its full efficiency, he stated it had already proved of practical utility on some navies. The world-famous University of Columbia invested the distinguished visitor with the honorary degree of Doctor of Science on June 6th, 1917.

South America.—Wireless activities have also been rife in South America. A new radio station has been instituted at Viacha, near La Paz, in Bolivia. The Peruvian Government has authorised the construction of a number of installations at various points in the basin of the Amazon, as well as an installation at Cachendo, lying between Mollendo and Arequipa. The Chilean Government voted \$175,000 towards the erection in the Magellan territory of three wireless stations.

Brazil and Argentina have both been busy. The latter republic, however, felt itself obliged, in its indignation against the infamy of the *spurlos versenkt* message dispatched by Count Luxburg through the intermediary of the Swedish Diplomatic Service, to put a stop to progress with an important Teutonic station in the course of erection, through the intermediary of the German Siemens-Schuckert Company at Plomar in Argentina.

Africa Purged of German Wireless.—The purging of Africa from enemy wireless influence was rounded off by the adhesion to the Allied cause of the Liberian republic. Liberia had a German long-distance wireless station established at Monrovia, the capital of this Black republic, erected as part of the Teutonic world-wide plot for "peaceful penetration."

Scandinavia.—Nor have radio activities been confined to extra European countries. The establishment of wireless has been going on very rapidly in Scandinavia. At the close of the year Norway announced the proximate opening at Stavanger of an extremely powerful installation; Rundemand Station, near Bergen, was opened in the early part of the year, and Tryvand Station, near Christiania, is

expected to be ready in the near future, whilst Denmark has not only been increasing her radiotelegraphic plant in the Mother Country, and established a school of radiotelegraphy at Svenborg, but has also extended the boon of wireless to her dependencies of Iceland and the Faröe Islands. Sweden also recently erected a long-distance station at Karlsborg.

Netherlands.—Amongst the various other activities of the Dutch Government we may instance the establishment of two new radiotelegraphic stations on lightships at the Dogger Bank, one situated at the north and one at the south thereof.

British Government.—At the beginning of August the British Government found it advisable, in national interests, to suspend the Transatlantic Commercial Wireless Service both eastbound and west bound.

NATIONAL AND INTERNATIONAL WIRELESS LAWS AND REGULATIONS

THE signing of the International Convention for the Safety of Life at Sea on January 20th, 1914, constituted a most noteworthy advance in the legislation relating to Wireless Telegraphy. The Convention was drawn up by an International Conference which met at London on November 12th, 1913, and laid down, *inter alia*, the minimum Wireless Telegraphy equipment to be carried by ships of different grades. For the purpose of defining the hours of service (*i.e.*, setting out the times when the various stations are to open for the receipt and transmission of messages) the Radiotelegraphic Convention, 1912, divided ship stations into three classes, but did not specify which vessels (by virtue of the services maintained on board) should be placed in the various classes. Under the provisions of the Safety of Life at Sea Convention which deal with Wireless Telegraphy these classes are clearly defined.

In order to give effect to this International Convention, the British Government has amended the laws relating to merchant ships by the Merchant Shipping (Convention) Act, 1914. Part III. of the Act deals with Wireless Telegraphy, and is reprinted under "*Great Britain*" in the "*Laws and Regulations*" section of this book. The Act was due to come into force on July 1st, 1915, but has not yet been put into operation.

Legislation relating to Wireless Telegraphy does not date back further than the year 1903, although four years earlier (in 1899) the Marconi system had reached a point of development sufficiently advanced for the British Admiralty to think it desirable to obtain sets of the apparatus for trial, and two years later (in 1901) an agreement of a limited nature was entered into between the Admiralty and the Company for the supply of Marconi apparatus. In July, 1903, a further and more complete agreement was concluded. At that time the increasing use of Wireless Telegraphy for maritime purposes throughout the world had raised questions of international interest and circumstances had clearly demonstrated that international agreement was desirable with regard to many points dealing with the interchange of messages through the newly-established medium.

A conference met at Berlin in August, 1903, on the invitation of the German Government. As a result of that conference all the Powers, with the exception of Great Britain and Italy, agreed

to certain proposals, to be considered at a subsequent conference, for the international regulation of Wireless Telegraphy. The British delegates had been instructed to maintain an attitude of reserve owing to the position in which Wireless Telegraphy was placed in the United Kingdom, the fact being that in the state of the law at that time the Government had not sufficient control over Wireless Telegraphy to enable them to give effect to the provisions of the Convention. The Wireless Telegraphy Act, which was passed in 1904 for two years only, and which was renewed in 1906 without modification (and is still in force), prohibits the installation or working of wireless telegraph apparatus in the United Kingdom, or on board British ships, except under licence from the Postmaster-General. Its principal objects were, by means of systematic regulations, to make Wireless Telegraphy more useful for purposes of defence and general communication. The memorandum which was laid before the House of Commons in explanation of the Bill stated that the necessity for legislation depended, firstly, on the importance from the naval point of view of giving the Government control over wireless stations in time of war or emergency; and, secondly, on the desirability of placing the Government in such a position as to have the power of entering into an agreement on the subject with other countries if it should be found expedient to do so.

In October, 1906, a second International Conference was held in Berlin, and its primary objects may be classified under the following headings:—(1) The acceptance and transmission of telegrams. (2) The adoption of rules of working. (3) The provision of means of collecting charges and settling accounts between the different countries. (4) Arrangements for the publication of all information necessary for inter-communication. (5) Rules to prevent interference and confusion in working, with adequate provisions for enforcement. (6) Provision that, with certain exceptions, inter-communication must not be refused on account of the differences in the systems of Wireless Telegraphy employed.

The documents signed at Berlin on November 3rd, 1906, consisted of:—(a) The Convention; (b) the Additional Undertaking; (c) the Final Protocol; (d) the Service Regulations. These documents were revised at the London Convention held in 1912, and the Radiotelegraphic Convention which came into operation on July 1st, 1913, is printed *in extenso* in the following pages.

At the outbreak of the present war immediate steps were taken by the Governments of the belligerent countries to bring the use of Wireless Telegraphy under direct official control, and

all stations not operated under Government supervision were ordered by the respective Governments to be dismantled.

This action, as might well have been expected, did not stop at the belligerent countries, but extended to neutral Governments almost all over the world. It was necessary that steps should be taken by non-belligerent powers to ensure that their neutrality obligations were not violated by the utilisation of wireless stations in their territory for the transmission of communications of a non-neutral character. Consequently, almost all countries throughout the world issued special regulations relating to the use of Wireless Telegraphy; but as these regulations were all made with the same object in view they naturally differ but slightly from one another. In the section of this book devoted to Laws and Regulations the more important of these regulations have been reprinted.

The central agency established for the purpose of collecting and distributing information in accordance with the requirements of the International Radiotelegraphic Convention is commonly known as the "Berne Bureau." This is merely a branch of the Bureau of the International Telegraph Union, situated at Berne, in Switzerland. It possesses neither powers for initiating new regulations nor for dealing with those already existing; its functions are practically entirely confined to the collection and circulation of information.

Notwithstanding this, the International Bureau at Berne has become an organisation of supreme importance, thanks to the zealous, economical and efficient manner in which it is conducted. To this organisation is entrusted the work of preparing and circulating, in accordance with Article 13 of the Convention, particulars regarding every station located in countries adhering to the Convention, such as their names, nationality, geographical position, call signals, normal range, wave length, nature of service performed, hours open, etc.

The normal supplementary expenses resulting from the work of the International Bureau in connection with radiotelegraphy must not exceed 80,000 francs per annum. This sum, however, does not include any special expenditure such as would be necessitated by the holding of an International Conference. For the purpose of fixing their respective contributions towards the expenses, the governing bodies of the contracting States are divided into six classes, as set forth in Article 43 of the regulations.

Despite the war at present raging, the "Berne Bureau" has continued its distribution of information.

INTERNATIONAL RADIO- TELEGRAPHIC CONVENTION

London, July 5th, 1912

International Radiotelegraphic Convention concluded between Great Britain and various British Colonies and Protectorates, the Union of South Africa, the Commonwealth of Australia, Canada, British India, New Zealand, Greece, Italy and the Italian Colonies, Germany and the German Protectorates, the United States of America and the Possessions of the United States of America, the Argentine Republic, Austria, Hungary, Bosnia-Herzegovina, Belgian Congo, Brazil, Bulgaria, Chili, Denmark, France and Algeria, French West Africa, French Equatorial Africa, Indo-China, Madagascar, Tunis, Japan and Chosen, Formosa, Japanese Sakhalin and the Leased Territory of Kwantung, Morocco, Monaco, Norway, the Netherlands, the Dutch Indies and the Colony of Curaçao, Persia, Portugal and the Portuguese Colonies, Roumania, Russia and the Russian Possessions and Protectorates, the Republic of San Marino, Siam, Spain, Sweden, Turkey and Uruguay.

The undersigned Plenipotentiaries of the Governments of the countries enumerated above, being assembled in Conference in London, have, by mutual consent, and subject to ratification, concluded the following Convention :—

ARTICLE I.

The High Contracting Parties undertake to apply the provisions of the present Convention at all the radiotelegraph stations (coast stations and ship stations) which are established or worked by the Contracting Parties and open for the service of public correspondence between the land and ships at sea.

They undertake, moreover, to impose the observance of these provisions upon private enterprises authorised either to establish or to work radiotelegraphic coast stations open to the service of public correspondence between the land and ships at sea, or to establish or to work radiotelegraphic stations whether open for public correspondence or not on board the ships which carry their flag.

ARTICLE 2.

The term coast station means radiotelegraphic station established on land or on board any ship permanently anchored and used for the exchange of correspondence with ships at sea.

The term ship station means any radiotelegraphic station established on board a ship other than a permanently moored ship.

ARTICLE 3.

Coast stations and ship stations are bound to exchange radiotelegrams reciprocally without regard to the radiotelegraph system adopted by such stations.

Each ship station is bound to exchange radiotelegrams with any other ship station without distinction as to radiotelegraphic system adopted by such stations.

Nevertheless, in order not to impede scientific progress, the provisions of the present Article do not prevent the contingent employment of a radiotelegraphic system incapable of communicating with other systems, provided that such incapacity be due to the specific nature of such system and that it be not caused by devices adopted solely with the object of preventing intercommunication.

ARTICLE 4.

Notwithstanding the provisions of Article 3, a station may be appropriated to a restricted public service determined by the object of the correspondence or by other circumstances independent of the system employed.

ARTICLE 5.

Each of the High Contracting Parties undertakes to cause the coast stations to be connected with the telegraph system by means of special wires, or, at least, to take such other measures as will ensure a rapid exchange between the coast stations and the telegraph system.

ARTICLE 6.

The High Contracting Parties shall mutually notify one another of the names of the coast stations and ship stations covered by Article 1, as well as of all the particulars necessary to facilitate and accelerate the radiotelegraphic exchanges as specified in the Detailed Regulations.

ARTICLE 7.

Each of the High Contracting Parties reserves to itself the right to prescribe or to permit in the stations covered by

Article 1—independently of the installation of which the particulars are published conformable to Article 6—the installation and working of other arrangements designed for special radiotelegraphic transmission without publication of the details of such devices.

ARTICLE 8.

The working of radiotelegraphic stations shall be organised as far as possible in such a manner as not to interfere with the working of other stations of the kind.

ARTICLE 9.

Radiotelegraphic stations shall be obliged to accept with absolute priority calls of distress from whatever source, to reply in like manner to such calls, and to give the effect to them which they require.

ARTICLE 10.

The charge for a radiotelegram shall include, according to the circumstances :—

1. (a) The “ coast charge ” which accrues to the coast station.
(b) The “ ship charge ” which accrues to the ship station.
2. The charge for transmission over the lines of the telegraph system, calculated in accordance with the ordinary rules.
3. The transit charges of the intermediate coast or ship stations and the charges appertaining to special services required by the sender.

The rate of the coast charge shall be subject to the approval of the Government to whose authority the coast station is subject, and the rate of the ship charge to the approval of the Government to which the ship belongs.

ARTICLE 11.

The provisions of the present Convention are completed by Detailed Regulations which have the same validity and come into force at the same time as the Convention.

The provisions of the present Convention and of the Regulations relating thereto may be modified at any time by mutual consent of the High Contracting Parties. Conferences of Plenipotentiaries having power to modify the Convention and the Regulations shall take place periodically; each Conference shall itself fix the place and time of the succeeding Conference,

ARTICLE 12.

These Conferences shall be composed of Delegates of the Governments of the Contracting Parties.

In the deliberations each country shall have one vote only.

If a Government adhere to the Convention for its colonies, possessions or protectorates, subsequent Conferences may determine that the whole or part of such colonies, possessions or protectorates is to be regarded as forming a country for the purposes of the foregoing clauses. But the number of votes to be exercised by a Government, including its colonies, possessions or protectorates, may not exceed six.

The following are regarded as forming a single country for the purposes of the present Article :—

The Union of South Africa.

The Australian Commonwealth.

Canada.

British India.

New Zealand.

German East Africa.

German South-West Africa.

The Cameroons.

Togoland.

The German Pacific Protectorates.

Alaska.

Hawaii and the other American possessions in Polynesia.

The Philippine Islands.

Porto Rico and the American possessions in the Antilles.

The zone of the Panama Canal.

The Belgian Congo.

The Spanish Colony of the Gulf of Guinea.

French West Africa.

French Equatorial Africa.

Indo-China.

Madagascar.

Tunisia.

Erythrea.

Italian Somaliland.

Chosen, Formosa, Japanese Sakalin and the leased territory of Kwantung.

The Dutch Indies.

The Colony of Curaçao.

Portuguese West Africa.

Portuguese East Africa and the Portuguese possessions in Asia.

Russian Central Asia (littoral of the Caspian Sea).

Bokhara.

Khiva.

Western Siberia (littoral of the Arctic Ocean).

Eastern Siberia (littoral of the Pacific Ocean).

ARTICLE 13.

The International Bureau of the Telegraph Union shall be entrusted with the duty of collecting, co-ordinating, and publishing information of every kind relating to radiotelegraphy; of circulating in proper form proposals for the modification of the Convention, and of the Regulations; of notifying the changes adopted, and, generally, of carrying out any Administrative work which it may be called upon to undertake in the interests of International Radiotelegraphy.

The expenses of this institution shall be borne by all the Contracting Parties.

ARTICLE 14.

Each of the High Contracting Parties reserves to itself the right to fix the conditions under which it will admit radiotelegrams coming from or destined for a station, whether a ship station or a coast station, which is not subject to the provisions of the present Convention.

If a radiotelegram is admitted, the ordinary charges must be applied to it.

Every radiotelegram originating at a ship station and received by a coast station of the contracting country, or accepted in transit by the Administration of a contracting country, shall be sent forward.

Every radiotelegram intended for a ship shall also be sent forward if the Administration of the contracting country has accepted it from the sender, or if the Administration of a contracting country has accepted it in transit from a non-contracting country, subject to the right of the coast station to refuse transmission to a ship station belonging to a non-contracting country.

ARTICLE 15.

The provisions of the Articles 8 and 9 of this Convention are equally applicable to radiotelegraphic installations other than those indicated in Article 1.

ARTICLE 16.

Governments which have not taken part in the present Convention shall be allowed to become party to it at their own request.

Such adherence shall be notified through diplomatic channels to that one of the contracting Governments in whose territory the last Conference was held, and by that Government to the others.

Such adherence shall involve complete acceptance of all the clauses of the present Convention and admission to all the advantages stipulated therein.

The adherence to the Convention of the Government of a country having colonies, possessions, or protectorates shall not carry with it the adherence of the colonies, possessions, or protectorates of such Government, unless a declaration be made to that effect by such Government. These colonies, possessions, or protectorates as a whole, or each one of them separately, may form the subject of a separate adherence or of a separate denunciation under the conditions indicated in the present Article and in Article 22.

ARTICLE 17.

The provisions of Articles 1, 2, 3, 5, 6, 7, 8, 11, 12, and 17, of the International Telegraph Convention of St. Petersburg dated 10/22 July 1875 shall be applicable to International Radiotelegraphy.

ARTICLE 18.

In cases of difference of opinion between two or more contracting Governments concerning the interpretation or the execution either of the present Convention or of the Regulations provided for by Article 11, the question at issue may, by mutual consent, be submitted to arbitration. In that event each of the Governments concerned shall choose another not interested in the question.

The decision of the Arbitrators shall be made by an absolute majority of votes.

In the event of an equality of votes, the Arbitrators shall appoint, in order to settle the difficulty, another Contracting Government not concerned in the question in dispute. In default of an agreement with regard to such choice, each Arbitrator shall propose a Contracting Government not interested in the dispute; and lots shall be drawn as between the Governments proposed.

The drawing of lots shall be the prerogative of the Government in whose territory the International Bureau provided for in Article 13 performs its work.

ARTICLE 19.

The High Contracting Parties undertake to adopt or to propose to their respective legislatures the measures necessary to ensure the execution of the present Convention.

ARTICLE 20.

The High Contracting Powers shall communicate to one another such laws as may have been already enacted or which may be about to be so enacted in their countries, relating to the subject of the present Convention.

ARTICLE 21.

The High Contracting Parties maintain their entire liberty concerning the radiotelegraphic installations not covered by Article 1, and particularly with regard to naval and military installations, and also to stations carrying out communications between fixed points. All such installations and stations shall remain subject solely to the obligations provided for in Articles 8 and 9 of the present Convention.

Nevertheless when these installations and stations carry out an exchange of maritime public correspondence, they shall conform, in carrying out such service, to the requirements of the Regulations so far as concerns the method of transmission and accounting.

If, on the other hand, coast stations carry out, at the same time as public correspondence with ships at sea, communications between fixed points, they shall not be subject, in the execution of this latter service, to the provisions of the Convention, except as to the observance of Articles 8 and 9 of this Convention.

However, fixed stations which carry out correspondence between land and land must not refuse the exchange of radiotelegrams with another fixed station on account of the system adopted by such station; nevertheless, the liberty of each country shall remain complete in respect of the organisation of the service for correspondence between fixed points and the decision as to the correspondence to be carried out by the stations appropriated to such service.

ARTICLE 22.

The present Convention shall come into execution on and from the 1st of July 1913, and shall remain in force for an inde-

terminable period and until the expiry of one year from the day upon which it is denounced.

Denunciation shall only take effect as regards the Government in whose name it is made. So far as the other Contracting Parties are concerned, the Convention shall remain in force.

ARTICLE 23.

The present Convention shall be ratified, and the ratification thereof shall be deposited in London with as little delay as possible.

If one or more of the High Contracting Parties shall not ratify the Convention, it shall not be less valid thereby for the Parties which have ratified it.

In witness whereof the respective Plenipotentiaries have signed the Convention in a single copy, which shall remain deposited in the archives of the British Government, and of which a copy shall be sent to each Party.

London, the 5th of July, 1912.

FINAL PROTOCOL.

At the time of proceeding to the signature of the Convention adopted by the International Radiotelegraphic Conference of London, the undersigned Plenipotentiaries have agreed as follows :—

I.

The exact nature of the adherence notified on the part of Bosnia-Herzegovina not being yet determined, it is recognised that Bosnia-Herzegovina is entitled to a vote, a decision at a later date being necessary on the question whether this vote belongs to Bosnia-Herzegovina in virtue of the second paragraph of Article 12 of the Convention, or whether this vote is accorded to it conformably to the provisions of the third paragraph of that Article.

II.

The following declaration is placed on record :—

The Delegation of the United States declares that its Government is under the necessity of abstaining from all action with regard to tariffs, because the transmission of radiotelegrams as well as of telegrams in the United States is undertaken, wholly or in part, by commercial or private companies.

III.

The following declaration was also placed on record :—

The Government of Canada reserves to itself the right to fix

separately, for each of its coast stations, a total sea charge for radiotelegrams originating from North America and intended for any ship whatever, the coast charge amounting to three-fifths and the ship charge to two-fifths of such total charge.

In witness whereof the respective Plenipotentiaries have drawn up the present Final Protocol, which shall have the same force and the same validity as if the provisions thereof had been inserted in the text itself of the Convention to which it belongs, and they have signed it in a single copy which shall remain deposited in the archives of the British Government, and of which a copy shall be sent to each party.

London, the 5th of July, 1912.

SERVICE REGULATIONS ANNEXED TO THE INTERNATIONAL RADIOTELEGRAPHIC CONVENTION.

CONTENTS.

1. Organisation of radiotelegraphic stations.
2. Hours of service of stations.
3. Form and acceptance of radiotelegrams.
4. Charges.
5. Collection of charges.
6. Transmission of radiotelegrams :—
 - (a) Signals of transmission.
 - (b) Order of transmission.
 - (c) Calling of stations and transmission of radiotelegrams.
 - (d) Acknowledgment of receipt and end of work.
 - (e) Route to be followed by radiotelegrams.
7. Delivery of radiotelegrams.
8. Special radiotelegrams.
9. Records.
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11. Accounting.
12. International Bureau.
13. Meteorological, time, and other transmissions.
14. Miscellaneous provisions.

I.—ORGANISATION OF RADIOTELEGRAPHIC STATIONS.

I.

The choice of radiotelegraphic apparatus and devices to be used by coast stations and ship stations is free. The installation

of these stations must, as far as possible, be in keeping with scientific and technical progress.

II.

Two wave-lengths, one of 600 and the other of 300 metres, shall be admitted for the service of general public correspondence. Every coast station open to this service must be equipped in such a way as to be able to use these two wave-lengths, of which one shall be designated as the normal wave-length of the station. During the whole time that it is open every coast station must be in a position to receive calls made by means of its normal wave-length. Nevertheless, for the correspondence covered by paragraph 2 of Regulation XXXV., use shall be made of a wave-length of 1,800 metres. Further, each Government may authorise the use, in a coast station, of other wave-lengths for the purpose of securing a long-range service or a service other than that of general public correspondence, and established in conformity with the provisions of the Convention, with the reservation that these wave-lengths do not exceed 600 metres, or that they do exceed 1,600 metres.

In particular, stations used exclusively for the despatch of signals intended to determine the position of ships must not use wave-lengths exceeding 150 metres.

III.

1. Every ship station must be equipped in such a way as to be able to use the wave-lengths of 600 metres and of 300 metres. The first shall be the normal wave-length, and may not be exceeded in transmission, the case of Regulation XXXV. (paragraph 2) excepted.

Use may be made of other wave-lengths not exceeding 600 metres in special cases, and subject to the approval of the Administrations to which the coast stations and ship stations concerned are subject.

2. During the whole time that it is open every ship station must be able to receive calls made by means of its normal wave-length.

3. Ships of small tonnage, in the case of which it would be materially impossible to use the wave-length of 600 metres for transmission, may be authorised to employ exclusively the wave-length of 300 metres; they must be able to receive by means of the wave-length of 600 metres.

IV.

Communications between a coast station and a ship station, or between two ship stations, must be exchanged on both sides by means of the same wave-length. If, in a particular case, communication is difficult, the two stations may, by mutual consent, pass from the wave-length by means of which they are communicating to the other regulation wave-length. Both stations shall resume their normal wave-lengths when the radiotelegraphic exchange is finished.

V.

1. The International Bureau shall prepare, publish and revise periodically an official map showing the coast stations, their normal ranges, the principal lines of navigation, and the time normally taken by ships for the voyage between the various ports of call.

2. It shall draw up and publish a Nomenclature of the radiotelegraphic stations covered by Article I. of the Convention, and also periodical supplements for additions and modifications. This Nomenclature shall give, in the case of each station, the following information :—

1st.—For coast stations : the name, nationality, and geographical position indicated by the territorial sub-division and by the longitude and latitude of the place ; for ship stations : the name and nationality of the ships ; when the case arises, the name and address of the contractor.

2nd.—The call signal. (The call signals must be differentiated from one another, and each one must consist of a group of three letters.)

3rd.—The normal range.

4th.—The radiotelegraphic system with the characteristics of the system of discharge (musical sparks, tone expressed by the number of double vibrations, etc.).

5th.—The wave-lengths used (the normal wave-length to be underlined).

6th.—The nature of the services performed.

7th.—The hours of working.

8th.—When necessary the hour and method of despatch of time signals and meteorological telegrams.

9th.—The coast or ship charge.

3. There shall also be included in the Nomenclature such information relating to radiotelegraphic stations other than those

covered by Article 1 of the Convention, as shall be communicated to the International Bureau by the Administrations to which such stations are subject, provided that these are either Administrations which are parties to the Convention, or, if they are not parties to it, have made the declaration provided for in Regulation XLVIII.

4. The following notations shall be adopted in documents for the use of the international service to designate radiotelegraph stations :—

PG—station open for general public correspondence.

PR—station open for restricted public correspondence.

P—private station.

O—station open only for official correspondence.

N—station always open.

X—station not having fixed working hours.

5. The name of a ship station indicated in the first column of the Nomenclature must be followed, when there is duplication of the name, by the call-signal of such station.

VI.

The exchange of unnecessary signals and words is forbidden to the stations covered by Article 1 of the Convention. Experiments and practice shall not be allowed in these stations, except so far as they do not disturb the service of other stations.

Practice must be carried out with wave-lengths different from those allowed for public correspondence, and with the minimum of power necessary.

VII.

1. All stations are bound to exchange traffic with the minimum of energy necessary to ensure good communication.

2. Every coast and ship station must comply with the following conditions :—

(a) The waves emitted must be as pure and as little damped as possible.

In particular, the use of transmitting devices in which the production of the waves emitted is obtained by discharging the aerial direct by sparks (plain aerial) shall not be allowed except in cases of distress.

It may, however, be allowed in the case of certain special stations (for example those of small ships) in which the primary power does not exceed 50 watts.

(b) The apparatus must be capable of transmitting and

receiving at a speed at least equal to 20 words per minute, the word being reckoned at the rate of five letters.

New installations bringing into play an energy of more than 50 watts shall be equipped in such a way that it may be possible to obtain easily several ranges less than the normal range, the shortest being of approximately 15 nautical miles. Installations already established bringing into play an energy of more than 50 watts shall be transformed as far as possible in such a manner as to satisfy the foregoing requirements.

- (c) Receiving apparatus must allow of receiving, with the greatest possible amount of protection from disturbance, transmissions made with the wave-lengths specified in present Regulations, up to 600 metres.

3. Stations serving solely for determining the position of ships (*radiophares*) must not operate over an area of greater radius than 30 nautical miles.

VIII.

Independently of the general conditions specified in Regulation VII., ship stations must also satisfy the following conditions :—

- (a) The power transmitted to the radiotelegraphic apparatus, measured at the terminals of the generator of the station, must not under normal circumstances exceed one kilowatt.
- (b) Subject to the provisions of Regulation XXXV., par. 2. a power exceeding one kilowatt may be used, if the ship is under the necessity of corresponding at a distance of more than 200 nautical miles from the nearest coast station, or if, in consequence of exceptional circumstances, communication cannot be realised except by means of an increase of power.

IX.

1. No ship station may be established or worked by private enterprise without a licence issued by the Government to which the ship is subject.

Stations on board ship having their port of register in a colony, possession, or protectorate may be described as being subject to the authority of such colony, possession, or protectorate.

2. Every ship station holding a licence issued by one of the contracting Governments must be regarded by the other Governments as having an installation fulfilling the conditions imposed by the present Regulations.

The competent authorities of the countries where the ship calls may demand the production of the licence. In default of such production, these authorities may ascertain whether the radiotelegraph installations of the ship satisfy the conditions imposed by the present Regulations.

When an Administration has practical evidence that a ship station is not fulfilling these conditions, it must, in every case, address a complaint to the Administration of the country to which the ship is subject. From that point onwards the procedure shall be, when necessary, as provided in Regulation XII., paragraph 2.

X.

1. The service of the ship station must be carried out by a telegraphist holding a certificate issued by the Government to which the ship is subject, or, in an emergency and for one voyage only, by another Government party to the convention.

2. There shall be two classes of certificates :

The first-class certificate shall state the professional qualifications of the operator with regard to :—

- (a) the adjustment of the apparatus and knowledge of their working ;
- (b) transmitting and receiving by ear, at a speed which must not be less than 20 words per minute.
- (c) knowledge of the regulations applying to the exchange of radiotelegraphic communications.

The second-class certificate may be issued to a telegraphist who only attains to a speed in transmitting and receiving of 12 to 19 words per minute, but who fulfils the other conditions mentioned above. Telegraphists holding a second-class certificate may be allowed :—

(a) on ships only using radiotelegraphy for their own service and for the correspondence of the ship's company, in particular on fishing vessels ;

(b) on all ships as substitutes, provided that such ships have on board at least one operator holding a first-class certificate. Nevertheless, on ships placed in the first class indicated in Reg. XIII., the service must be carried

out by at least two telegraphists holding first-class certificates.

In ship stations, transmissions may only be made by a telegraphist holding a first or second-class certificate, an exception being made of cases of emergency, in which it would be impossible to conform to this provision.

3. Further, the certificate shall testify that the Government has placed the telegraphist under the obligation of preserving the secrecy of correspondence.

4. The radiotelegraph service of the ship station shall be placed under the supreme authority of the captain of the ship.

XI.

Ships provided with radiotelegraph installations and placed in the first two classes indicated in Reg. XIII. shall be bound to have emergency radiotelegraph installations of which all the parts shall be placed in conditions of the greatest safety possible, such conditions to be determined by the Government which issues the licence. These emergency installations must have at command a source of power of their own, must be capable of being set working speedily, must be able to work for six hours at least, and must have a minimum range of 80 nautical miles in the case of ships in the first class, and of 50 miles in the case of those of the second class. This emergency installation shall not be required in the case of ships whose ordinary installation fulfils the conditions of the present article.

XII.

1. If an Administration has information of a breach of the Convention or of the Regulations committed in one of the stations which it has authorised, it shall ascertain the facts and fix the responsibility.

In the case of ship stations, if the responsibility rests on the operator, the Administration shall take the necessary steps, and, if necessary, shall withdraw the certificate. If it is shown that the breach was due to the condition of the apparatus or to instructions given to the telegraphist, the same procedure shall be followed in respect of the licence issued to the ship.

2. In the event of repeated breaches by the same ship, if the representations made to the Administration to which the ship is subject, by another Administration, remain without effect, the latter shall have the right, after notice given, of authorising its coast stations not to accept communications coming from the ship

in question. In case of a difference between the two Administrations, the question shall be submitted to Arbitration on the request of one of the Governments concerned. The procedure is indicated in Article XVIII. of the Convention.

II.—HOURS OF SERVICE OF STATIONS.

XIII.

(a) *Coast Stations.*

1. The service of coast stations shall be, as far as possible, permanent, day and night, without interruptions.

Nevertheless certain coast stations may have a service of limited duration. Each Administration shall fix the hours of service.

2. Coast stations whose service is not permanent may not close before having transmitted all their radiotelegrams to the ships which are in their radius of action nor before having received from such ships all the radiotelegrams of which notice has been given. This provision shall also apply when ships notify their presence before work has actually ceased.

(b) *Ship Stations.*

3. Ship stations shall be placed in three classes :—
- 1st, stations always open;
 - 2nd, stations having limited working hours;
 - 3rd, stations having no fixed working hours.

During navigation, the following must remain permanently on the watch: 1st, ships of the first class; 2nd, those of the second class, during the hours that they are open for service; out of these hours, the latter stations must remain on the watch for the first 10 minutes of each hour. The stations of the third class are not bound to perform any regular "listening" service.

It shall fall to the Governments which issue the licences specified in Article IX. to fix the class in which the ship is to be placed, in respect of its obligations in the matter of keeping watch. This classification shall be mentioned in the licence.

III.—DRAWING UP AND HANDING IN OF RADIO-TELEGRAMS.

XIV.

1. Radiotelegrams shall bear, as the first word of the preamble, the service instructions "radio."

2. In the transmission of radiotelegrams coming from a ship

at sea, the date and the hour of the handing in at the ship station shall be indicated in the preamble.

3. On forwarding over the telegraph system, the coast station shall insert, as the indication of the office of origin, the name of the ship of origin as it appears in the Nomenclature, and also, when the case arises, that of the last ship which served as an intermediary. These particulars shall be followed by the name of the coast station.

XV.

1. The address of radiotelegrams intended for ships must be as complete as possible. It shall be compulsorily drawn up as follows :—

- (a) Name or title of the addressee, with supplementary particulars if necessary.
- (b) Name of the ship, as it appears in the first column of the Nomenclature.
- (c) Name of the coast station, as it appears in the Nomenclature.

Nevertheless the name of the ship may be replaced, at the risks and perils of the sender, by the particulars of the voyage taken by such ship and determined by the names of the ports of origin and destination or by any other equivalent particulars.

2. In the address, the name of the ship, as it appears in the first column of the Nomenclature, shall be counted in every case, and independently of its length, as one word.

3. Radiotelegrams drawn up by means of the International Signal Code shall be forwarded to their destination without being de-coded.

IV.—CHARGES.

XVI.

1. The coast charge and the ship charge shall be fixed in accordance with the tariff per word pure and simple, on the basis of a fair remuneration for radiotelegraphic work, with optional application of a minimum charge per radiotelegram.

The coast charge may not exceed 60 centimes per word, nor the ship charge 40 centimes per word. Nevertheless each Administration shall have the right to authorise coast and ship charges higher than these maxima in the case of stations having a range of more than 400 nautical miles, or if stations exceptionally onerous on account of the material conditions of their installation or working.

The optional minimum charge per radiotelegram may not exceed the coast or ship charge for a radiotelegram of 10 words.

2. In the case of radiotelegrams originating from or intended for a country or exchanged directly with the coast stations of that country, the charge applying to the transmission over the lines of the telegraph system must not exceed, on the average, that of the inland rate of that country.

This charge shall be reckoned per word pure and simple, with an optional minimum charge not exceeding the charge for 10 words. It shall be notified in francs by the Administration of the country to which the coast station is subject.

In the cases of countries in the European system, with the exception of Russia and Turkey, there shall only be a single charge for the territory of each country.

XVII.

1. When a radiotelegram originating from a ship and intended for *terra firma* passes through one or two ship stations, the charge shall include, in addition to those of the ship of origin, the coast station, and the telegraph system, the ship charge of each of the ships taking part in the transmission.

2. The sender of a radiotelegram originating from *terra firma* and intended for a ship may require that his message be transmitted by way of one or two ship stations; he shall deposit for this purpose the amount of the radiotelegraphic and telegraphic charges, and besides, as a deposit, a sum to be fixed by the office of origin with a view to the payment to the intermediate ship stations of the transit charges fixed in paragraph 1; he must further pay, as he may choose, either the charge for a telegram of five words or the cost of postage of a letter to be sent by the coast station to the office of origin giving the information necessary to the liquidation of the sum deposited.

The radiotelegram shall then be accepted at the risks and perils of the sender; it shall bear before the address the paid additional particulars "x retransmissions telegraphe" or "x retransmissions lettre" (x representing the number of retransmissions required by the sender) accordingly as the sender desires that the information necessary for the liquidation of the deposit be furnished by telegram or by letter.

3. The charge for radiotelegrams originating from a ship, intended for another ship, and sent by way of one or two intermediate coast stations, shall include:—

The ship charges of both ships, the charge of the coast

station or the two coast stations, as the case may be, and when necessary the telegraph charge appropriate to the transit between the two coast stations.

4. The charge for radiotelegrams exchanged between ships without the aid of a coast station includes the ship charges of the ship of origin and of the ship of destination, with the ship charges of the intermediate stations added thereto.

5. The coast and ship charges due to the stations of transit shall be the same as those fixed for such stations when these are stations of origin and destination. In no case shall they be collected more than once.

6. In the case of any intermediate coast station, the charge to be collected for the transit service shall be the highest of the coast charges appertaining to the direct exchange with the two ships in question.

XVIII.

The country in whose territory is established a coast station acting as intermediary for the exchange of radiotelegrams between a ship station and another country shall be regarded, for the purpose of applying telegraphic charges, as the country of origin or of destination of such radiotelegrams and not as the country of transit.

V.—COLLECTION OF CHARGES.

XIX.

1. The total charge for radiotelegrams shall be collected from the sender, with the exception—1st, of the cost of express delivery (Article LVIII., paragraph 1, of the Telegraph Regulations); 2nd, of the charges applying to inadmissible joinings or alterations of words noted by the office or station of destination (Article XIX., paragraph 9, of the Telegraph Regulations), these charges being collected from the addressee.

Ship stations must possess the necessary tariffs for this purpose. They shall have, however, the right to obtain information from coast stations with regard to charges for radiotelegrams for which they do not possess all the necessary information.

2. The counting of words by the office of origin shall be decisive in the case of radiotelegrams addressed to ships, and that of the ship station of origin shall be decisive in the case of radiotelegrams originating in ships, both for the purpose of transmission and for that of the international accounts. Nevertheless when the radiotelegram is worded wholly or in part either

in one of the languages of the country of destination, in the case of radiotelegrams originating in ships, or in one of the languages of the country to which the ship belongs, in the case of radiotelegrams addressed to ships, and when the radiotelegram contains joinings or alterations of words contrary to the common use of that language, the office or ship station of destination, as the case may be, shall have the right to recover from the addressee the amount of the charge not collected. In the case of a refusal to pay the radiotelegram may be withheld.

VI.—TRANSMISSION OF RADIOTELEGRAMS.

(a) *Signals of Transmission.*

XX.

The signals employed shall be those of the International Morse Code.

XXI.

Ships in distress shall make use of the following signal,

... — — — ...

repeated at short intervals, followed by the necessary particulars.

As soon as a station hears the signal of distress, it must suspend all correspondence and must not resume the same until after it has made sure that the communication consequent upon the call for help is finished.

The stations which hear a call of distress must act according to indications given by the ship which makes the call, with regard to the order of messages or their cessation.

When, at the end of a series of distress calls, there is added the call signal of the particular station, the reply to the call is proper to that station only, unless that station does not reply. Failing the indication of a particular station in the call for help, every station that hears the call shall be bound to reply thereto.

XXII.

For the purpose of giving or asking information concerning the radiotelegraph service, stations must make use of the signals contained in the list appended to the present Regulations. (See p. 74.)

(b) *Order of Transmission.*

XXIII.

Between two stations, radiotelegrams of the same class shall be transmitted singly in alternate order or by series of several radiotelegrams, according to the instructions given by the coast

station, on condition that the duration of the transmission of each series do not exceed 15 minutes.

(c) *Calling of Stations and Transmission of Radiotelegrams.*

XXIV.

1. As a general rule, it shall be the ship station that calls the coast station, whether it has radiotelegrams to transmit or not.

2. In waters where the radiotelegraphic traffic is congested (the Channel, etc.), the call of a ship to a coast station may not, as a general rule, be made unless the latter is within the normal range of the ship station and the ship station has approached to a distance less than 75 per cent. of the normal range of the coast station.

3. Before proceeding to make a call, the coast station or the ship station must adjust its receiving system to the highest possible degree of sensitiveness, and must make sure that no other communication is being made within its radius of action; if it is otherwise, it shall await the first break, unless it finds that its call is not likely to disturb the communication in progress. The same applies when the station wishes to answer a call.

4. For making a call, every station shall use the normal wave of the station to be called.

5. If, in spite of these precautions, a radiotelegraphic transmission be impeded, the call must cease on the first request made by a coast station open to public correspondence. This station must then indicate the approximate duration of the wait.

6. The ship station must make known to each coast station to which it has notified its presence the time at which it proposes to cease its operations, and also the probable duration of the interruption.

XXV.

1. The call comprises the signal — . — . —, the call signal of the station called, sent three times, and the word "de," followed by the call signal of the sending station, sent three times.

2. The station called shall reply by giving the signal — . — . —, followed by the call signal, sent three times, of the calling station, by the word "de" its own call signal and the signal — . —

3. Stations which wish to enter into communication with ships, without, however, knowing the names of those ships which are within their radius of action, may use the signal

— . — . — — . — (signal of enquiry). The provisions of paragraphs 1 and 2 are also applicable to the transmission of the signal of enquiry and to the reply to that signal.

XXVI.

If a station when called does not reply when the call (Regulation XXV.) has been sent three times at intervals of 2 minutes, the call may not be resumed until after an interval of 15 minutes, the station making the call first making sure of the fact that no radiotelegraphic communication is in progress.

XXVII.

Every station which has to make a transmission necessitating the use of high power shall first send out three times the warning signal — — . . — —, with the minimum of power necessary to reach the neighbouring stations. It shall not then begin to transmit with the high power until 30 seconds after sending the warning signal.

XXVIII.

1. As soon as the coast station has replied, the ship station shall furnish it with the following information if it has messages to transmit to it; this information shall also be given when the coast stations ask for it:—

- (a) The approximate distance, in nautical miles, of the vessel from the coast station;
- (b) The position of the ship given in a concise form and adapted to the circumstances of the individual case;
- (c) The next port at which the ship will touch;
- (d) The number of radiotelegrams if they are of normal length or the number of words if the messages are of exceptional length.

The speed of the ship in nautical miles shall be given specially at the express request of the coast station.

2. The coast station shall reply giving, as provided in paragraph 1, either the number of telegrams or the number of words to be transmitted to the ship and also the order of transmission.

3. If transmission cannot take place immediately the coast station shall inform the ship station of the approximate length of the wait.

4. If a ship station when called cannot receive for the moment it shall inform the calling station of the approximate length of the wait.

5. In the case of exchanges between two ship stations it shall rest with the station called to fix the order of transmission.

XXIX.

When a coast station is called by several ship stations, it shall decide the order in which these stations shall be allowed to exchange their messages.

In the regulation of this order, the coast station shall be guided solely by the necessity for allowing every station concerned to exchange the greatest possible number of radiotelegrams.

XXX.

Before beginning to exchange correspondence, the coast station shall inform the ship station whether the transmission is to be made in alternate order by series (Regulation XXIII.); it shall then begin to transmit, or shall follow up these instructions by the signal — . —

XXXI.

The transmission of a radiotelegram shall be preceded by the signal — . — . — and ended by the signal . — . — . followed by the call signal of the sending station and by the signal — . —

In the case of a series of radiotelegrams, the call-letter of the sending station and the signal — . — shall only be given at the end of the series.

XXXII.

When the radiotelegram to be transmitted contains more than 40 words, the sending station shall interrupt the transmission by the signal . . — — . . after each series of 20 words or thereabouts, and it shall not resume transmission until after having obtained from the station in correspondence the repetition of the last word clearly received, followed by the said signal, or, if the reception is clear, the signal — . —

In the case of transmission in series, the acknowledgment of receipt shall be given after each radiotelegram.

Coast stations engaged in transmitting long radiotelegrams must suspend transmission at the end of each period of 15 minutes, and must remain silent during a period of 3 minutes before continuing transmission.

Coast and ship stations which work in the conditions laid down in Regulation XXXV., paragraph 2, must suspend work at the end of each period of 15 minutes, and keep watch on the wave-length

of 600 metres during a period of 3 minutes before continuing transmission.

XXXIII.

1. When the signals become doubtful, all possible resources must be drawn upon to accomplish transmission. To this end, the radiotelegram shall be transmitted three times at most, at the request of the receiving station. If in spite of this triple transmission the signals are still unintelligible, the radiotelegram shall be cancelled.

If the acknowledgment of receipt does not come to hand, the sending station shall again call the station with which it is in correspondence. When no reply is made after three calls, the transmission shall not be persevered with. In such case, the sending station shall have the right to obtain the acknowledgment of receipt through the medium of another radiotelegraph station, using, when necessary, the lines of the telegraph system.

2. If the receiving station considers that, in spite of defective receiving, the radiotelegram can be delivered, it shall insert at the end of the preamble the service advice "Reception douteuse" and shall forward the radiotelegram. In such case, the Administration to which the coast station is subject shall claim the charges, in conformity with Clause XLII. of the present Regulations. Nevertheless, if the ship station later on transmits the radiotelegram to another coast station of the same Administration, the latter can only claim the charges appertaining to a single transmission.

(d) *Acknowledgment of Receipt and End of Work.*

XXXIV.

1. The acknowledgment of receipt shall be given in the form prescribed by the International Telegraph Regulations; it shall be preceded by the call signal of the sending station and followed by the call signal of the receiving station.

2. The end of the work between two stations shall be indicated by each one of them by means of the signal . . . — . — followed by its own call signal.

(e) *Route to be taken by Radiotelegrams.*

XXXV.

1. As a general principle, the ship station shall transmit its radiotelegrams to the nearest coast station.

However, if the ship station has the choice between several coast stations at equal or nearly equal distances, it shall give

the preference to that which is established on the territory of the country of destination or of normal transit of its radiotelegrams.

2. Nevertheless, a sender on board a ship shall have the right to indicate the coast station by which he wishes his radiotelegram to be forwarded. The ship station shall then wait until this coast station is the nearest.

Exceptionally, transmission may be made to a more distant coast station, provided :—

- (a) that the radiotelegram is intended for the country in which such coast station is situated and that it comes from a ship subject to that country;
- (b) that for calls and transmission both stations use a wave length of 1,800 metres;
- (c) that transmission by this wave-length does not disturb any transmission made, by means of the same wave-length, by a nearer coast station;
- (d) that the ship station is more than 50 nautical miles distant from any coast station shown in the Nomenclature. The distance of 50 miles may be reduced to 25 miles, subject to the reservation that the maximum power at the terminals of the generator do not exceed 5 kilowatts and that the ship stations be established in conformity with Regulations VII. and VIII. This reduction of distance shall not apply in the seas, bays or gulfs of which the shores belong to one country only and of which the opening to the high sea is less than 100 miles wide.

VII.—DELIVERY OF RADIOTELEGRAMS.

XXXVI.

When for any cause whatsoever a radiotelegram coming from a ship at sea and intended for *terra firma* cannot be delivered to the addressee an advice of non-delivery shall be sent out. This advice shall be transmitted to the coast station which received the original radiotelegram. The latter, after verifying the address, shall forward the advice to the ship, if possible, and, if need be, by way of another coast station of the same country or of a neighbouring country.

When a radiotelegram, having arrived at the ship station, cannot be delivered, that station shall inform the office or ship station of origin by means of a service advice. In the case of radiotelegrams coming from *terra firma* this advice shall be trans-

mitted, whenever possible, to the coast station by way of which the radiotelegram passed, or, if necessary, to another coast station of the same country or of a neighbouring country.

xxxvii.

If the ship to which the radiotelegram is addressed has not notified its presence to the coast station within the time specified by the sender, or, in the absence of such specification, up to the morning of the eighth day following, such coast station shall give notice of the fact to the office of origin, which shall inform the sender of the same.

This latter shall have the option of requiring by paid service advice, telegraphic or postal, addressed to the coast station, that his radiotelegram be kept for a fresh period of nine days, for transmission to the ship, and so on. In the absence of such request the radiotelegram shall be returned as undelivered at the end of the ninth day (the day of handing in not to be included).

However, if the coast station is sure that the ship has left its radius of action before the station could have transmitted the radiotelegram to it, such station shall immediately inform the office of origin, which shall without delay advise the sender of the cancellation of the message. Nevertheless, the sender may, by paid service advice, request the coast station to transmit the radiotelegram when the ship next passes.

VIII.—SPECIAL RADIOTELEGRAMS.

xxxviii.

The following only shall be allowed :—

1st, *Reply Paid Radiotelegrams*.—These radiotelegrams shall bear, before the address, the indication, “ Réponse payée,” or “ RP,” completed by the mention of the amount paid in advance for the reply—for example : “ Réponse payée fr. x,” or “ RP, fr. x.”

The reply voucher issued on board a ship shall give the right to send, up to the limit of its value, a radiotelegram to any address whatever from the ship station which issues such voucher.

2nd, *Collated Radiotelegrams*.

3rd, *Express Delivery Radiotelegrams*.—But only in cases in which the amount of the cost of express delivery is collected from the addressee. The countries which cannot adopt these radiotelegrams must notify the fact to the International Bureau. Radiotelegrams for express delivery, with collection of the cost from the sender, may be allowed when they are intended for the

country in whose territory the corresponding coast station is situated.

4th, *Radiotelegrams for Delivery by Post.*

5th, *Multiple Radiotelegrams.*

6th, *Radiotelegrams with Acknowledgment of Receipt.*—But only with regard to notification of the date and time at which the coast station has transmitted to the ship station the telegram addressed to the latter.

7th, *Paid Service Advices.*—Except those asking for repetition of information. Nevertheless, all paid service advices shall be allowed on the route over the telegraph lines.

8th, *Urgent Radiotelegrams.*—But only in transmission over the telegraph lines, and subject to the application of the International Telegraph Regulations.

XXXIX.

Radiotelegrams may be transmitted by a coast station to a ship, or by a ship to another ship, with the object of being forwarded by post, the posting to take place from a port of call of the receiving ship.

The address of these radiotelegrams must be drawn up as follows :—

1st, Paid instruction “poste,” followed by the name of the port where the radiotelegram is to be posted ;

2nd, Full name and address of the addressee ;

3rd, Name of the ship station which is to carry out the posting ;

4th, When necessary, name of the coast station.

Example : Poste Buenos Aires, Martinez, 14 Calle Prat, Valparaiso, Avon Lizard.

The charge shall include, as well as the radiotelegraph and telegraph charges, a sum of 25 centimes for the postage of the radiotelegram.

IX.—ARCHIVES.

XL.

The originals of radiotelegrams, as well as the documents relating thereto, retained by the Administrations, shall be kept with all necessary precautions in respect of secrecy for at least fifteen months, counting from the month following that in which the radiotelegrams were handed in.

These originals and documents shall be sent, as far as

possible, at least once a month by the ship stations to the Administrations to which they are subject.

X.—REFUNDS AND REIMBURSEMENTS.

XLI.

With regard to refunds and reimbursements, the provisions of the International Telegraph Regulations shall apply, bearing in mind the restrictions laid down in Clauses XXXVIII. and XXXIX. of the present Regulations and subject to the following reservations:—

The time occupied in radiotelegraphic transmission, and also the time during which the radiotelegram remains at the coast station in the case of radiotelegrams addressed to ships, or in the ship station in the case of radiotelegrams originating in ships, shall not be counted in the period of delay giving rise to refunds and reimbursements.

If the coast station informs the office of origin that a radiotelegram cannot be transmitted to the ship to which it is addressed, the Administration of the country of origin shall immediately initiate the reimbursement to the sender of the coast and ship charges in respect of such radiotelegram. In this case, the charges reimbursed shall not appear in the account for which provision is made by Regulation XLII., but the radiotelegram shall be mentioned therein as a memorandum.

Reimbursements shall be borne by the various Administrations and private enterprises which have taken part in the forwarding of the radiotelegram, each one of them relinquishing its share of the charge. Nevertheless, radiotelegrams falling under the provision of Articles VII. and VIII. of the Convention of St. Petersburg shall remain subject to the provisions of the International Telegraph Regulations, except when it is due to an error of service that such radiotelegrams have been accepted.

When the acknowledgment of receipt of a radiotelegram has not reached the station which transmitted the message, the charge shall not be refunded until it has been proved that the radiotelegram is one which gives occasion for reimbursement.

XI.—ACCOUNTING.

XLII.

1. Coast and ship charges shall not be entered in the accounts provided for by the International Telegraph Regulations.

The accounts relating to these charges shall be settled by the Administrations of the countries concerned. They shall be

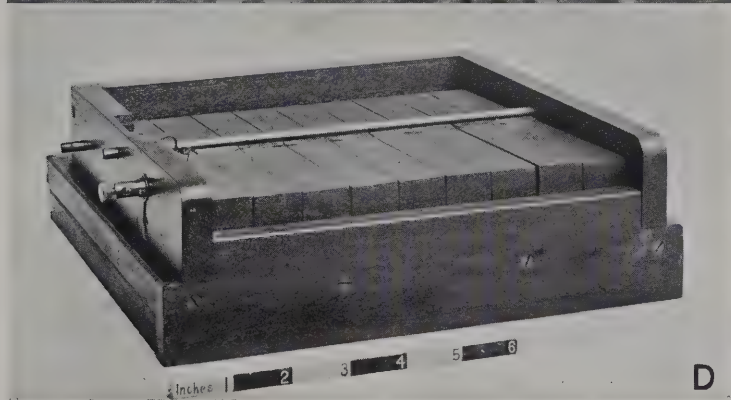
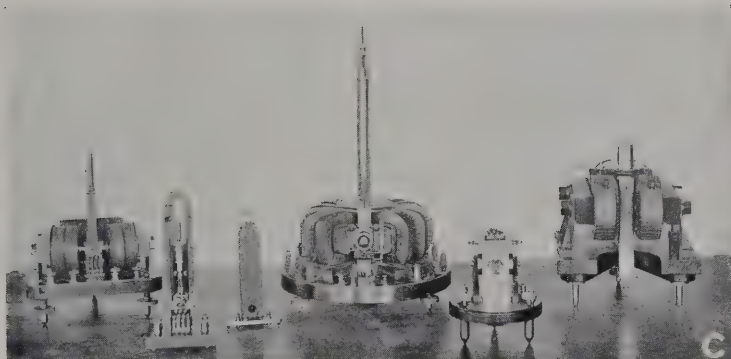
prepared by the Administrations to which the coast stations belong, and communicated by them to the Administrations concerned. In cases in which the working of the coast stations is independent of the Administration of the country, the person working these stations may be substituted in respect of accounts for the Administration of such country.

2. As to transmission over the lines of the telegraph system the radiotelegram shall be treated in respect of accounts in conformity with the Telegraph Regulations.

3. In the case of radiotelegrams originating from ships the Administration to which the coast station is subject shall debit the Administration to which the ship station of origin is subject with the coast and ordinary telegraph charges, the total charges collected for prepaid replies, the coast and telegraph charges collected for collations, the charges appertaining to express delivery (in the case provided for in Regulation XXXVIII.) or delivery by post, and with those collected for supplementary copies (TM). The Administration to which the coast station is subject shall credit, when the case arises, through the channel of the telegraph accounts and through the medium of the offices which have taken part in the transmission of the radiotelegrams, the Administration to which the office of destination is subject with the total charges relating to prepaid replies. With regard to telegraph charges and charges relating to express delivery or delivery by post, and to supplementary copies, the procedure shall be in conformity with the telegraph regulations, the coast station being regarded as the telegraph office of origin.

In the case of radiotelegrams intended for a country lying beyond that to which the coast station belongs, the telegraph charges to be liquidated conformably to the above provisions are those which arise either from tables "A" and "B" appended to the International Telegraph Regulations or from special arrangements concluded between the Administrations of adjoining countries, and published by those Administrations, and not the charges which might be made under the special provisions of Regulations XXIII. (paragraph 1) and XXVII. (paragraph 1) of the Telegraph Regulations.

In the case of radiotelegrams and paid-service advices addressed to ships, the Administration to which the office of origin is subject shall be debited directly by that to which the coast station is subject with the coast and ship charges. Nevertheless,



HISTORICAL APPARATUS (II.)

C. OSCILLOGRAPHS INVENTED BY MR. DUDDELL.

D. MUSICAL ARC KEYBOARD MADE BY THE INVENTOR.

the total charges appertaining to prepaid replies shall be credited, if there is occasion, from country to country through the channel of the telegraph accounts, until they reach the Administration to which the coast station is subject. In respect of the telegraph charges and charges relating to delivery by post and for supplementary copies, the procedure shall be in conformity with the telegraph regulations. The Administration to which the coast station is subject shall credit that to which the ship of destination is subject with the ship charge, if there is occasion, with the charges belonging to the intermediate ship stations, with the total charge collected for prepaid replies, with the ship charge relating to collation, and also with the charges made for preparing supplementary copies and for delivery by post.

The paid service advices, and the prepaid replies themselves, shall be treated, in the radiotelegraph accounts, in all respects like other radiotelegrams.

In the case of radiotelegrams forwarded by means of one or two intermediate ship stations, each of the latter shall debit the ship station of origin, if the radiotelegram is one coming from a ship, or the ship station of destination if the radiotelegram is one intended for a ship, with the ship charge due to it for transit.

4. In principle the settlement of account appertaining to exchanges between ship stations shall be made directly as between the companies working those stations, the station of origin being debited by the station of destination.

5. The monthly accounts serving as a basis for the special accounting in respect of radiotelegrams shall be drawn up radiotelegram by radiotelegram, with all necessary particulars, and within a period of six months counting from the month to which they belong.

6. The Governments reserve to themselves the option of making between themselves and with private companies (contractors working radiotelegraphic stations, shipping companies, etc.) special arrangements with a view to the adoption of other provisions respecting accounts.

XII.—INTERNATIONAL BUREAU.

XLIII.

The supplementary expenses resulting from the work of the International Bureau in connection with radiotelegraphy must not exceed 80,000 fcs. per annum, not including special expenses to which the meeting of an International Conference gives rise.

The Administrations of the contracting States shall be, for purposes of contribution towards the expenses, divided into six classes as follows :—

1st Class.—Union of South Africa, Germany, United States of America, Alaska, Hawaii, and the other American possessions in Polynesia, the Philippine Islands, Porto Rico and the American possessions in the Antilles, the zone of the Panama Canal, the Argentine Republic, Australia, Austria, Brazil, Canada, France, Great Britain, Hungary, British India, Italy, Japan, New Zealand, Russia, Turkey.

2nd Class.—Spain.

3rd Class.—Russian Central Asia (littoral of the Caspian Sea), Belgium, Chili, Chosen, Formosa, Japanese Sakhalin and the leased territory of Kwantung, Dutch Indies, Norway, Holland, Portugal, Roumania, Western Siberia (littoral of the Arctic Ocean), Eastern Siberia (littoral of the Pacific Ocean), Sweden.

4th Class.—German East Africa, German South-West Africa, The Cameroons, Togoland, German Pacific Protectorates, Denmark, Egypt, Indo-China, Mexico, Siam, Uruguay.

5th Class.—French West Africa, Bosnia-Herzegovina, Bulgaria, Greece, Madagascar, Tunis.

6th Class.—French Equatorial Africa, Portuguese West Africa, Portuguese East Africa and the Portuguese possessions in Asia, Bokhara, the Belgian Congo, the Colony of Curaçao, the Spanish Colony of the Gulf of Guinea, Erythrea, Khiva, Morocco, Monaco, Persia, San Marino, Italian Somaliland.

XLIV.

The various Administrations shall forward to the International Bureau a form modelled on that hereto appended (see pp. 73 and 74) and containing the particulars enumerated in the form with regard to the stations covered by Clause V. of the Regulations. Any modifications which may take place and additions shall be communicated by the Administrations to the International Bureau from the 1st to the 10th of each month. With the help of these communications the International Bureau will draw up the Nomenclature provided for by Regulation V. The Nomenclature shall be distributed to the Administrations concerned. It may also, with the supplements relating thereto, be sold to the public at cost price.

The International Bureau shall take care that the adoption of identical call signals for radiotelegraph stations be avoided.

XIII. — METEOROLOGICAL TRANSMISSIONS, TIME SIGNALS, AND OTHER TRANSMISSIONS.

XLV.

1. The Administrations shall take the necessary steps to supply their coast stations with meteorological telegrams containing the particulars of interest to the district of such stations. These telegrams, the text of which must not exceed twenty words, shall be sent to the ships which ask for them. The charge for these meteorological telegrams shall be carried to the account of the ships to which they are addressed.

2. The meteorological observations, made by certain ships appointed for that purpose by the country to which they belong, may be sent once a day as paid service advices to the coast stations authorised to receive them by the Administrations concerned, who shall also appoint the meteorological offices to which these observations shall be addressed by the coast station.

3. Time signals and meteorological telegrams shall be transmitted in succession one to another in such a way that the total duration of their transmission does not exceed ten minutes. In principle, while they are being sent, all radiotelegraph stations, transmission by which might disturb the reception of these signals and telegrams, shall keep silent so as to allow all stations which desire to do so to receive these telegrams and signals. Exception shall be made in the case of distress calls and State telegrams.

4. The Administrations shall facilitate the communication to the marine information agencies which they may appoint of the information respecting wrecks and casualties at sea, or presenting a general interest for navigation, which the coast stations can communicate regularly.

XIV.—MISCELLANEOUS PROVISIONS.

XLVI.

Transmission exchanged between ship stations must be carried out in such a way as not to interfere with the service of coast stations, as the latter must have, as a general rule, right of priority for public correspondence.

XLVII.

Coast stations and ship stations shall be bound to take part in the retransmission of radiotelegrams in cases in which com-

munication cannot be established directly between the stations of origin and destination.

Nevertheless, the number of transmissions shall be limited to two.

In the case of radiotelegrams intended for *terra firma* use may only be made of retransmissions to reach the nearest coast station.

Retransmission shall be in all cases subject to the condition that the intermediate station which receives the radiotelegram in transit is in a position to send it on.

XLVIII.

If the transmission of a radiotelegram is carried out partly on the telegraph lines or through radiotelegraph stations belonging to a non-contracting Government, such radiotelegram may be sent forward, subject to the reservation that at least the Administrations to which these lines or stations belong shall have declared that they are willing to apply, when the case arises, the provisions of the Convention and of the Regulations, which are indispensable, in order that radiotelegrams may be regularly forwarded, and that accounting may be assured.

Such declaration shall be made to the International Bureau, and brought to the knowledge of the offices of the Telegraph Union.

XLIX.

The modifications of the present Regulations which may be rendered necessary in consequence of the decisions of future Telegraph Conferences shall come into force on the date fixed for the application of the provisions decided upon by each one of these later Conferences.

L.

The provisions of the International Telegraph Regulations shall apply by analogy to radiotelegraph correspondence in so far as they are not contrary to the provisions of the present Regulations.

The following in particular apply to radiotelegraph correspondence :—

The provisions of Article XXVII., paragraphs 3 to 6, of the Telegraph Regulations referring to the collection of charges; those of Articles XXXVI. and XLI. referring to the indication of the route to be taken; those of Articles LXXV., paragraph 1, LXXVIII., paragraphs 2 to 4, and LXXIX., para-

graphs 2 to 4, relating to preparing of accounts. Nevertheless, first, the period of six months provided by paragraph 2 of Article LXXIX. of the Telegraph Regulations for the verification of accounts is extended to nine months in the case of radiotelegrams; second, the provisions of Article XVI., paragraph 2, are not considered as authorising the free transmission by radiotelegraph stations of service telegrams relating exclusively to the telegraph service, nor the free transmission over the lines of the telegraph system of service telegrams relating exclusively to the radiotelegraph service; third, the provisions of Article LXXIX., paragraphs 3 and 5, do not apply to radiotelegraph accounting. For the purposes of applying the provisions of the Telegraph Regulations coast stations shall be regarded as offices of transit, except when the Radiotelegraphic Regulations stipulate expressly that these stations are to be considered as offices of origin or destination.

Conformable to Article II. of the Convention of London the present regulations will come into force on the 1st of July, 1913.

In witness whereof the respective Plenipotentiaries have signed these Regulations on a single copy, which will remain deposited in the archives of the British Government, and of which a copy will be sent to each party.

APPENDIX

I.

Table referred to in Regulation XLIV. (p. 70).

(a) COAST STATIONS

Name.	Nationality.	Geographical Position. E=East longitude; O=West longitude; N=North latitude; S=South latitude. Territorial subdivisions.	Call Signal.	Normal Range in Nautical Miles.	Radiotelegraph System, with the characteristics of the System of emission.	Wave-lengths in metres (the normal wave-length is underlined).
Nature of Services effected.	Working hours (Time according to the Meridian).	Coast Charge.		Observations (if occasion, Time and Method of sending Time-Signals and Meteorological Telegrams).		
		Per Word in Francs.	Minimum per Radiotelegram in Francs.			

(b) SHIP STATIONS.

Name.	Nationality.	Call Signal.	Normal Range in Nautical Miles.	Radiotelegraph System, with the characteristics of the System of emission.	Wave-lengths in Metres.
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Nature of Services effected.	Working Hours.	Ship Charge.		Observations (if occasion, Name and Address of the person working the Station).
		Per Word in Francs.	Minimum per Radiotelegram in Francs.	

1° WARSHIPS.

2° MERCHANT SHIPS.

II.

LIST OF ABBREVIATIONS TO BE USED IN RADIOTELEGRAPH TRANSMISSIONS (referred to in Article XXII, p. 59).

Abbrevia- tion. I.	Question. 2.	Answer or Advice. 3.
— . — . — . — (CQ)	.. ..	Inquiry signal employed by a station which desires to correspond.
— . — . (TR)	.. ..	Signal announcing the sending of indications concerning a ship station (article XXVIII).
— — . . — — !)	.. ..	Signal indicating that a station is about to send with high power.
PRB	Do you wish to communicate with my station by means of the International Signal Code ?	I wish to communicate with your station by means of International Signal Code.
QRA	What is the name of your station ?	This station is
QRB	How far are you from my station ?	The distance between our stations is nautical miles.
QRC	What are your true bearings ?	My true bearings are degrees.
QRD	Where are you bound ?	I am bound for
QRF	Where are you coming from ?	I am coming from
QRG	To what company or line of navigation do you belong ?	I belong to
QRH	What is your wave-length ?	My wave-length is metres.
QRJ	How many words have you to transmit ?	I have words to transmit.
QRK	How are you receiving ?	I am receiving well.
QRL	Are you receiving badly ? Shall I transmit 20 times ...— so that you can adjust your apparatus ?	I am receiving badly. Transmit 20 times ...— so that I can adjust my apparatus.
QRM	Are you disturbed ?	I am disturbed.
QRN	Are the atmospherics very strong ?	The atmospherics are very strong.
QRO	Shall I increase my power ?	Increase your power.
QRP	Shall I decrease my power ?	Decrease your power.
QRQ	Shall I transmit faster ?	Transmit faster.
QRS	Shall I transmit more slowly ?	Transmit more slowly.
QRT	Shall I stop transmitting ?	Stop transmitting.
QRU	Have you anything for me ?	I have nothing for you.
QRV	Are you ready ?	I am ready. All is in order.
QRW	Are you busy ?	I am busy with another station (or with please do not interrupt)

QRX	Shall I wait ?	Wait. I will call you at o'clock (or when I want you).
QRY	What is my turn ?	Your turn is No.
QRZ	Are my signals weak ?	Your signals are weak.
QSA	Are my signals strong ?	Your signals are strong.
QSB	Is my tone bad ?	The tone is bad.
	Is my spark bad ?	The spark is bad.
QSC	Is the spacing bad ?	The spacing is bad.
QSD	Let us compare watches. My time is What is your time ?	The time is
QSF	Are the radiotelegrams to be transmitted alternately or in series ?	Transmission will be in alternate order.
QSG	—	Transmission will be in series of five radiotelegrams.
QSH	—	Transmission will be in series of ten radiotelegrams.
QSJ	What is the charge to collect for ?	The charge to collect is ...
QSK	Is the last radiotelegram cancelled ?	The last radiotelegram is cancelled.
QSL	Have you got the receipt ?	Please give a receipt.
QSM	What is your true course ?	My true course is degrees.
QSN	Are you communicating with land ?	I am not communicating with land.
QSO	Are you in communication with another station (or with) ?	I am in communication with (through the medium of).
QSP	Shall I signal to that you are calling him ?	Inform that I am calling him.
QSQ	Am I being called by ?	You are being called by
QSR	Will you dispatch the radiotelegram ?	I will forward the radiotelegram.
QST	Have you received a general call ? ..	General call to all stations.
QSU	Please call me when you have finished (or at o'clock)	I will call you when I have finished.
QSV	Is public correspondence engaged ?	Public correspondence is engaged. Please do not interrupt.
QSW	Must I increase the frequency of my spark ?	Increase the frequency of your spark.
QSY	Shall I transmit with a wave-length of metres ?	Let us transfer to the wave-length of metres.
QSX	Must I diminish the frequency of my spark ?	Diminish the frequency of your spark.

When an abbreviation is followed by a mark of interrogation it applies to the question indicated in respect of that abbreviation.

EXAMPLES.

Station.

A	QRA ?	What is the name of your station ?
B	QRA Campania	This is the Campania.
A	QRG ?	To what company or line of navigation do you belong ?
B	QRG Cunard. QRZ	I belong to the Cunard Line. Your signals are weak.
Station A then increases the power of its transmitter and sends :		
A	QRK ?	How are you receiving ?
B	QRK	I am receiving well.
	QRB 80	The distance between our stations is 80 nautical miles.
	QRC 62	My true bearings are 62 degrees, etc.

INTERNATIONAL CONVENTION ON SAFETY OF LIFE AT SEA

London, January 20, 1914.

THE London International Conference on the Safety of Life at Sea, by which the Convention signed on January 20th, 1914, has been drawn up, met for the first time on November 12th, 1913, at the Foreign Office, London. The suggestion that such a Conference should be held emanated from the German Emperor, and the task of convening it was undertaken by the British Government. The following States were represented:—Great Britain, Germany, the United States, Australia, Austria-Hungary, Belgium, Canada, Denmark, Spain, France, Italy, Japan, Norway, the Netherlands, Russia, Sweden, and New Zealand. The delegations from the different States were composed, not of the representatives of the shipping trade, but of administrators, experts and jurists.

Lord Mersey was appointed Chairman of the Conference. To deal with the specific subjects submitted to it the Conference appointed five sub-committees, together with a sixth sub-committee for drafting the Convention, which was to embody the recommendations of the Committees as approved by the whole Conference.

The Convention contains 74 Articles, of which we present below the articles governing the use of wireless telegraphy:—

CHAPTER I.—SAFETY OF LIFE AT SEA.

Article 1.—The High Contracting Parties undertake to give effect to the provisions of this Convention, for the purpose of securing safety of life at sea, to promulgate all regulations and to take all steps which may be necessary to give the Convention full and complete effect.

The provisions of this Convention are completed by Regulations which have the same force and take effect at the same time as the Convention. Every reference to the Convention implies at the same time a reference to the Regulations annexed thereto.

CHAPTER II.—SHIPS TO WHICH THIS CONVENTION APPLIES.

Article 2.—Except where otherwise provided by this Convention, the merchant ships of any of the States of the High Contracting Parties, which are mechanically propelled, which carry more than 12 passengers, and which proceed from a port of one of the said States to a port situated outside that State, or conversely, are subject to the provisions of this Convention. Ports situated in the Colonies, Possessions, or Protectorates of the High Contracting Parties are considered to be ports outside the States of the High Contracting Parties.

Persons who are on board by reason of *force majeure* or in consequence of the obligation laid upon the master to carry shipwrecked or other persons, are not deemed to be passengers.

Article 3.—There are excepted from this Convention, save in the cases where the Convention otherwise provides, ships making voyages specified in a schedule to be communicated by each High Contracting Party to the British Government at the time of ratifying the Convention.

No schedule may include voyages in the course of which the ships go more than 200 sea miles from the nearest coast.

Each High Contracting Party has the right subsequently to modify its schedule of voyages in conformity with this Article on condition that it notifies the British Government of such modification.

Each High Contracting Party has the right to claim from another Contracting Party the benefit of the privileges of the Convention for all of its ships which are engaged in any one of the voyages mentioned in its own schedule. For this purpose the Party claiming such benefit shall impose on the said ships the obligations prescribed by the Convention in so far as, having regard to the nature of the voyage, these obligations would not be unnecessary or unreasonable.

Article 4.—No ship, not subject to the provisions of the Convention at the time of its departure, can be subjected to the Convention in the course of its voyage, if stress of weather or any other cause of *force majeure* compels it to take refuge in a port of one of the States of the High Contracting Parties.

CHAPTER III.—SAFETY OF NAVIGATION.

Article 5.—When the expression “every ship” is used in this chapter and in the corresponding part of the annexed Regulations, it includes all merchant ships, whether they are the ships

defined in Article 2 or not, which belong to any of the Contracting States.

Article 6.—The High Contracting Parties undertake to take all steps to ensure the destruction of derelicts in the northern part of the Atlantic Ocean east of a line drawn from Cape Sable to a point situated in latitude 34° north and longitude 70° west. Further, they will establish in the North Atlantic with the least possible delay a service for the study and observation of ice conditions and a service of ice patrol. For this purpose:—

Two vessels shall be charged with these three services.

During the whole of the ice season they shall be employed in ice patrol.

During the rest of the year the two vessels shall be employed in the study and observation of ice conditions and in the destruction of derelicts; nevertheless the study and observation of ice conditions shall be effectively maintained, in particular from the beginning of February to the opening of the ice season.

While the two vessels are employed in ice patrol the High Contracting Parties, to the extent of their ability and so far as the exigencies of the Naval Service will permit, will send warships or other vessels to destroy any dangerous derelicts, if this destruction is considered necessary at that time.

Article 7.—The Government of the United States is invited to undertake the management of the three services of derelict destruction, study and observation of ice conditions, and ice patrol. The High Contracting Parties which are specially interested in these services, and whose names are given below, undertake to contribute to the expense of establishing and working the said services in the following proportions:—

	Per cent.
Austria-Hungary	2
Belgium	4
Canada	2
Denmark	2
France	15
Germany	15
Great Britain	30
Italy	4
Netherlands	4
Norway	3
Russia	2
Sweden	2
United States of America	15

Each of the High Contracting Parties has the right to discontinue its contribution to the expense of working these services after September 1st, 1916. Nevertheless, the High Contracting Party which avails itself of this right will continue responsible for the expenses of working up to the 1st September following the date of denunciation of the Convention on this particular point. To take advantage of the said right, it must give notice to the other Contracting Parties at least six months before the said 1st September; so that, to be free from its obligations on September 1st, 1916, it must give notice on March 1st, 1916, at the latest, and similarly for each subsequent year.

In case the United States Government should not accept the proposal made to them, or in case one of the High Contracting Parties, for any reason, should not assume responsibility for the pecuniary contribution defined above, the High Contracting Parties shall settle the question in accordance with their mutual interests.

The Government of the High Contracting Party which undertakes the management of the service of derelict destruction is invited to devise means of granting, at the expense of this service, to merchant ships, which have contributed in an effective manner to the destruction of ocean derelicts, rewards to be fixed by the Government in accordance with the services rendered.

The High Contracting Parties which contribute to the cost of the three above-mentioned services shall have the right by common consent to make from time to time such alterations in the provisions of this Article and of Article 6 as appear desirable.

Article 8.—The master of every ship which meets with dangerous ice or a dangerous derelict is bound to communicate the information by all the means of communication at his disposal to the ships in the vicinity, and also to the competent authorities at the first point of the coast with which he can communicate.

Every Administration which receives intelligence of dangerous ice or a dangerous derelict shall take all steps which it thinks necessary for bringing the information to the knowledge of those concerned and for communicating it to the other Administrations.

The transmission of messages respecting ice and derelicts is free of cost to the ships concerned.

It is desirable that the said information should be sent in a uniform manner. For this purpose a code, the use of which is optional, appears in Article I. of the Regulations annexed hereto.

Article 9.—The master of every ship fitted with a radio-telegraph installation, on becoming aware of the existence of an imminent and serious danger to navigation, shall report it immediately in the manner prescribed by Article II. of the Regulations annexed hereto.

Article 10.—When ice is reported on, or near, his course, the master of every ship is bound to proceed at night at a moderate speed, or to alter his course so as to go well clear of the danger zone.

Article 11.—The ships defined by Article 2 shall have on board a Morse signalling lamp of sufficient range.

The use of Morse signals is regulated by the Code appearing in Article III., as well as by Article IV. of the Regulations annexed hereto.

Article 12.—The use of the international distress signals for any other purpose than that of signals of distress is prohibited on every ship.

The use of private signals which are liable to be confused with the international distress signals is prohibited on every ship.

Article 13.—The selection of the routes across the North Atlantic in both directions is left to the responsibility of the steamship companies. Nevertheless the High Contracting Parties undertake to impose on these companies the obligation to give public notice of the regular routes which they propose their vessels should follow, and of any changes which they make in them.

The High Contracting Parties undertake, further, to use their influence to induce the owners of all vessels crossing the Atlantic to follow as far as possible the routes adopted by the principal companies.

Article 14.—The High Contracting Parties undertake to use all diligence to obtain from the Governments which are not parties to this Convention their agreement to the revision of the International Regulations for Preventing Collisions at Sea as indicated below :—

(A) The Regulations shall be completed or revised in regard to the following points :—

- (1) The second white light.
- (2) The stern light.
- (3) A day signal for motor vessels.
- (4) A sound signal for a vessel towed.
- (5) The prohibition of signals similar to distress signals.

(B) Articles 2, 10, 14, 15, 31 of the said Regulations shall be amended in accordance with the following provisions:—

Article 2. The second white mast-head light to be compulsory.

Article 10. A permanent fixed stern light to be compulsory.

Article 14. A special day signal to be compulsory for motor vessels.

Article 15. A special sound signal to be established for use by a vessel in tow, or if the tow is composed of several vessels, by the last vessel of the tow.

Article 31. Article 31 to be modified in the following manner:—Add to the lists of both day and night signals the international radiotelegraph distress signal.

Article 15.—The Governments of the High Contracting Parties undertake to maintain, or, if it is necessary, to adopt, measures for the purpose of ensuring that from the point of view of safety of life at sea, the ships defined in Article 2 shall be sufficiently and efficiently manned.

Chapter IV., which contains Articles 16 to 30, refers to construction.

CHAPTER V.—RADIOTELEGRAPHY.

Article 31.—All merchant ships belonging to any of the Contracting States, whether they are propelled by machinery or by sails, and whether they carry passengers or not, shall, when engaged on the voyages specified in Article 2, be fitted with a radiotelegraph installation if they have on board fifty or more persons in all.

Advantage may not be taken of the provisions of Articles 2 and 3 of this Convention to exempt a ship from the requirements of this chapter.

Article 32.—Ships on which the number of persons on board is exceptionally and temporarily increased up to or beyond fifty as the result of *force majeure*, or because the master is under the necessity of increasing the number of his crew to fill the places of those who are ill, or is obliged to carry shipwrecked or other persons, are exempted from the above obligation.

Moreover, the Governments of each of the Contracting States, if they consider that the route and the conditions of the voyage are such as to render a radiotelegraph installation

unreasonable or unnecessary, may exempt from the above requirement the following ships :—

(1) Ships which in the course of their voyage do not go more than 150 sea miles from the nearest coast.

(2) Ships on which the number of persons on board is exceptionally or temporarily increased up to or beyond fifty by the carriage of cargo hands for a part of the voyage, provided that the said ships are not going from one continent to another, and that, during that part of their voyage, they remain within the limits of latitude 30° N. and 30° S.

(3) Sailing vessels of primitive build, such as *dhow*s, *junks*, etc., if it is practically impossible to instal a radiotelegraph apparatus.

Article 33.—Ships which, in accordance with Article 31 above, are required to be fitted with a radiotelegraph installation are divided, for the purpose of radiotelegraph service, into three classes, in accordance with the classification established for ship stations in Article XIII. (b) of the Regulations annexed to the Radiotelegraph Convention, signed in London on July 5th, 1912, viz. :—

First Class.—Ships having a continuous service.

There shall be placed in the First Class ships which are intended to carry twenty-five or more passengers :—

(1) if they have an average speed in service of fifteen knots or more ;

(2) if they have an average speed in service of more than thirteen knots, but only subject to the two-fold condition that they have on board two hundred persons or more (passengers and crew), and that, in the course of their voyage, they go a distance of more than five hundred sea miles between any two consecutive ports. Nevertheless these ships may be placed in the Second Class on condition that they have a continuous watch.

Second Class.—Ships having a service of limited duration.

There shall be placed in the Second Class all ships which are intended to carry twenty-five or more passengers, if they are not, for other reasons, placed in the First Class.

Ships placed in the Second Class must, during navigation, maintain a continuous watch for at least seven hours a day, and a watch of ten minutes at the beginning of every other hour.

Third Class.—Ships which have no fixed periods of service.

All ships which are placed neither in the First nor in the Second Class shall be placed in the Third Class.

The owner of a ship placed in the Second or in the Third Class has the right to require that, if the ship complies with all the requirements for a superior class, a statement to the effect that it belongs to that superior class shall be inserted in the Safety Certificate.

Article 34.—Ships which are required by Article 31 above to be fitted with a radiotelegraph installation shall be required, by the Governments of the countries to which they belong, to maintain a continuous watch during navigation as soon as the said Governments consider that it will be of service for the purpose of safety of life at sea.

Meanwhile, the High Contracting Parties undertake to require, from the date of the ratification of the present Convention, subject to the delays specified below, a continuous watch on the following ships:—

(1) Ships whose average speed in service exceeds 13 knots, which have on board 200 persons or more, and which, in the course of their voyage, go a distance of more than 500 sea miles between two consecutive ports, when these ships are placed in the Second Class.

(2) Ships in the Second Class, for the whole of the time during which they are more than 500 sea miles from the nearest coast.

(3) Other ships specified in Article 31, when they are engaged in the Trans-Atlantic trade, or when they are engaged in other trades if their route takes them more than 1,000 sea miles from the nearest coast.

Ships connected with all kinds of fishing business, including whaling, which are required to be fitted with a radiotelegraph installation, shall not be required to maintain a continuous watch.

The continuous watch may be kept by one or more operators, holding certificates in accordance with Article X. of the Regulations annexed to the International Radiotelegraph Convention, 1912, together, if necessary, with one or more certificated watchers. Nevertheless, if an efficient automatic calling apparatus is invented, the continuous watch may be maintained by this

means by agreement between the Governments of the High Contracting Parties.

By "certificated watcher" is meant any person holding a certificate issued under the authority of the Administration concerned. To obtain this certificate, the applicant must prove that he is capable of receiving and understanding the radiotelegraph distress signal and the safety signal described in the Regulations annexed hereto.

The High Contracting Parties undertake to take steps to ensure that the certificated watchers observe the secrecy of correspondence.

Article 35.—The radiotelegraph installations required by Article 31 above shall be capable of transmitting clearly perceptible signals from ship to ship over a range of at least 100 sea miles by day under normal conditions and circumstances.

Every ship which is required, in conformity with the provisions of Article 31 above, to be fitted with a radiotelegraph installation, shall, whatever be the class in which it is placed, be provided in accordance with Article XI. of the Regulations annexed to the International Radiotelegraph Convention, 1912, with an emergency installation, every part of which is placed in a position of the greatest possible safety to be determined by the Government of the country to which the ship belongs.

In all cases the emergency installation must be placed, in its entirety, in the upper part of the ship, as high as practically possible.

The emergency installation includes, as provided by Article XI. of the Regulations annexed to the International Radiotelegraph Convention, 1912, an independent source of energy capable of being put into operation rapidly and of working for at least six hours with a minimum range of eighty sea miles for ships in the First Class and fifty sea miles for ships in the two other classes.

If the normal installation, which, in accordance with this Article, has a range of at least one hundred sea miles, satisfies all the conditions prescribed above, an emergency installation is not required.

The licence provided for in Article IX. of the Regulations annexed to the International Radiotelegraph Convention, 1912, may not be issued unless the installation complies both with the provisions of that Convention and also with the provisions of this Convention.

Article 36.—The matters governed by the International Radiotelegraph Convention, 1912, and the Regulations annexed thereto, and in particular the radiotelegraph installations on ships, the transmission of messages, and the certificates of the operators, remain and will continue subject to the provisions:

(1) of that Convention and the Regulations annexed thereto, or of any other instruments which may in the future be substituted therefor;

(2) of this Convention, in regard to all the points in which it supplements the aforementioned documents.

Article 37.—Every master of a ship who receives a call for assistance from a vessel in distress is bound to proceed to the assistance of the persons in distress.

Every master of a vessel in distress has the right to requisition from among the ships which answer his call for assistance the ship or ships which he considers best able to render him assistance, but he must exercise this right only after consultation, so far as may be possible, with the masters of those ships. Such ships are then bound to comply immediately with the requisition by proceeding with all speed to the assistance of the persons in distress.

The masters of the ships which are required to render assistance are released from this obligation as soon as the master or masters requisitioned have made known that they will comply with the requisition, or as soon as the master of one of the ships which has reached the scene of the casualty has made known to them that their assistance is no longer necessary.

If the master of a ship is unable, or considers it unreasonable or unnecessary, in the special circumstances of the case, to go to the assistance of the vessel in distress, he must immediately inform the master of the vessel in distress accordingly. Moreover, he must enter in his log-book the reasons justifying his action.

The above provisions do not prejudice the International Convention for the unification of certain rules with respect to Assistance and Salvage at Sea, signed at Brussels on September 23rd, 1910, and, in particular, the obligation to render assistance laid down in Article II. of that Convention.

Article 38.—The High Contracting Parties undertake to take all steps necessary for giving effect to the provisions of this chapter with the least possible delay. Nevertheless, they may allow:

A delay not exceeding one year, from the date of the

ratification of this Convention, for the provision and training of operators and for the installation of the apparatus on ships placed in the First and Second Classes.

A delay not exceeding two years, from the date of the ratification of this Convention, for the provision and training of the operators and watchers on the ships in the Third Class, for the installation of the apparatus on ships in the Third Class and for the establishment of a continuous watch on ships placed in the Second and Third Classes.

CHAPTER VI.—Refers to Life-saving Appliances and Fire Protection.

REGULATIONS.

SAFETY OF NAVIGATION.

ARTICLE I.

CODE FOR THE TRANSMISSION BY RADIOTELEGRAPHY OF INFORMATION RELATING TO ICE, DERELICTS, AND WEATHER.

INSTRUCTIONS.

Transmission of Information.—The transmission of information concerning ice and derelicts is obligatory. This information may be sent from ship to ship or to the Hydrographic Office, Washington, either in clear or by means of the abbreviations used in Part I. of this Code.

The transmission of information relating to weather is optional. Part II. of this Code may be used for this purpose, but may be modified at any time by the Meteorological Congress.

Information required:

PART I.—ICE AND DERELICTS.

1. The kind of ice or derelict observed.
2. The position of ice or derelict when last determined.

PART II.—METEOROLOGICAL INFORMATION.

1. The direction and force of the wind
2. The set and velocity of the current.
3. Weather or state of the sky at a fixed hour.
4. Height of barometer and air temperature.
5. Barometric tendency and sea-surface temperature.

The time to be adopted:

In all radiotelegrams relating to ice or derelicts the time shall be given in Greenwich mean time.

The Address:

Reports, when sent to the Hydrographic Office, Washington, should be addressed "Hydrographic"; reports to the Meteorological Office, London, should be addressed "Meteorology."

The Message:

1. When sending information about ice or derelicts alone, two groups of five figures each are used, preceded by the word "ice"; these groups may be repeated as often as necessary.

2. If meteorological information is to be sent in addition, a further four groups of five figures each are used, preceded by the word "weather." These groups are inserted at the end of the message after all the information relating to ice has been given.

N.B.—If the message contains the word "weather," all the code groups before that word give information relating to ice, and those after the word "weather" give meteorological information. If there is no word "weather" in the message, it only contains information about ice. (See examples of the two kinds of message given in this Article.)

PART I.

ICE AND DERELICTS.

Information respecting ice and derelicts is given by means of ten figures divided into two groups of five figures each. These groups are preceded by the word "ice."

Two figures... The day of the month (*dd*), according to Code I.

One figure ... The time of observation (*T*), according to Code II.

One figure ... The kind of ice observed (*I*), according to Code III.

Three figures The latitude of the ice observed (*p p p*), to tenths of a degree (see table below).

Three figures The longitude of the ice observed (*p' p' p'*), to tenths of a degree (see table below).

The first group consists of *ddTIp*.

The second group consists of *ppp'p'p'*.

CODES.

Code I.—*Day of the Month.*

The day of the month is given by two figures, of which the first may be zero: 01 to 31.

Code II.—Time of observation.

The time of observation is included between—

	Code No.
1 a.m. and 4 a.m. ... Greenwich Mean Time ...	1
4 a.m. and 7 a.m.	2
7 a.m. and 10 a.m.	3
10 a.m. and 1 p.m.	4
1 p.m. and 4 p.m.	5
4 p.m. and 7 p.m.	6
7 p.m. and 10 p.m.	7
10 p.m. and 1 a.m.	8

Code III.—Nature of Ice or Derelict observed.

0. No ice observed.
1. Single iceberg. Huge mass of floating ice.
2. Several icebergs.
3. Numerous icebergs.
4. Floeberg. Thick piece of salt-water ice like a small iceberg.
5. Field ice. Ice extending as far as the eye can reach, but through which it is possible to navigate.
6. Pack ice. Pieces of ice broken from berg or floe, partly closed together.
7. Land ice. Ice attached to the shore since the winter.
8. Derelict.
9. (Not allotted.)

EXAMPLE.

Message sent from Ship to Ship.

—	First Message.	Coded as	Second Message.	Coded as	Third Message.	Coded as	Fourth Message.	Coded as
Date of observation	15	15	15	15	15	15	16	16
Time of observation	10 a.m.— 1 p.m.	4	4 p.m.—7 p.m.	6	7 p.m.—10 p.m.	7	4 p.m.—7 a.m.	2
Nature of ice or derelict	Field	5	Numerous icebergs	3	Derelict	8	Single iceberg	1
Position of ice or derelict	Latitude 45° 42'	457	Latitude 46° 5'	461	Latitude 46° 25'	464	Latitude 47° 19'	473
	Longitude 46° 11'	462	Longitude 44° 40'	447	Longitude 43° 58'	440	Longitude 40° 15'	402

The code of the above message would thus be :

S.S. to S.S.

Ice, 15454, 57462 : 15634, 61447 : 15784, 64440 : 16214, 73402.

PART II.

METEOROLOGICAL INFORMATION.

Information respecting weather, etc., is given by four groups of five figures each. These groups are preceded by the word "weather."

First Group (DDPPP):

The day of the month: two figures (*DD*), according to Code I.

The position of the ship when transmitting the message, indicated by three figures (*PPP*), representing the 1° square in which the ship is situated, according to Code IV. and the numbered chart annexed to this Article.

Second Group (WWCCX):

Wind direction and force at 8 a.m. at the 75th meridian of west longitude: two figures (*WW*), according to Code V.

Set and velocity of current: two figures (*CC*), according to Code VI.

Weather or state of the sky at the same hour: one figure (*X*), according to Code VII.

Third Group (BBBAA):

The barometric height to tenths of a millimetre at 8 a.m. at the 75th meridian of west longitude: three figures (*BBB*), according to Code VIII.

Air temperature at the same hour: two figures (*AA*), according to Code IX.

Fourth Group (bbSSS):

Barometric tendency at 8 a.m. at the 75th meridian of west longitude: two figures (*bb*), according to Code X.

Sea surface temperature at the same hour: three figures (*SSS*), according to Code XI.

CODES.

Code IV.—*Position of Ship.*

A chart gives the numbers to be assigned to each 1° square in the North Atlantic. The position of the ship, when the meteorological data given in Part II. were observed, is indicated by the three figures representing the 1° square in which the ship is situated. For example:—A position 51° 55' N., 26° 49' W. would be reported as 561.

Code V.

Wind Direction (to 16 points) and *Wind Force* at 8 a.m. mean time at the 75th meridian of west longitude (*WW*).

—	Wind Force, Beaufort Scale.	N.N.E.	N.E.	E.N.E.	E.	E.S.E.	S.E.	S.S.E.	S.	S.S.W.	S.W.	W.S.W.	W.	W.N.W.	N.W.	N.N.W.	N.
Calm ...	0	00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Light Breeze ...	1, 2, or 3	01	07	13	19	25	31	37	43	49	55	61	67	73	79	85	91
Moderate breeze ...	4 or 5	02	08	14	20	26	32	38	44	50	56	62	68	74	80	86	92
Strong wind ...	6 or 7	03	09	15	21	27	33	39	45	51	57	63	69	75	81	87	93
Gale Force ...	8 or 9	04	10	16	22	28	34	40	46	52	58	64	70	76	82	88	94
Storm Force ...	10 or 11	05	11	17	23	29	35	41	47	53	59	65	71	77	83	89	95
Hurricane ...	12	06	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96

N.B.—The wind direction is to be referred to true bearings

Code VI.

Direction (to 16 points) and *Velocity of the Current* (*CC*).

Nautical Miles, per hour.	N.N.E.	N.E.	E.N.E.	E.	E.S.E.	S.E.	S.S.E.	S.	S.S.W.	S.W.	W.S.W.	W.	W.N.W.	N.W.	N.N.W.	N.
0.25	01	07	13	19	25	31	37	43	49	55	61	67	73	79	85	91
0.5	02	09	14	20	26	32	38	44	50	56	62	68	74	80	86	92
1	03	09	15	21	27	33	39	45	51	57	63	69	75	81	87	93
2	04	10	16	22	28	34	40	46	52	58	64	70	76	82	88	94
3	05	11	17	23	29	35	41	47	53	59	65	71	77	83	89	95
4	06	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96
00	No current.															
99	No observation.															

N.B.—The current is to be referred to true bearings.

Code VII.

The State of the Sky at 8 a.m. mean time at the 75th meridian of west longitude:

0. Sky quite clear.
1. Sky quarter clouded.
2. Sky half clouded.
3. Sky three-quarters clouded.
4. Sky entirely overcast.
5. Rain falling.
6. Snow or hail falling.
7. Haze or mist.
8. Fog.
9. Thunderstorm.

Code VIII.—Height of Barometer.

The reading of the mercury barometer is to be corrected for index error, and reduced to 0° C. and sea level. A table of corrections is given below.

The corrected reading is coded by omitting the first figure of the barometer reading in tenths of a millimetre: for example, 761.2 mm. is coded as 612.

A table for converting hundredths of an inch to tenths of a millimetre is given below.

Code IX.

Air Temperature is coded in two figures according to the following table:—

Degrees Centigrade.	Degrees Fahrenheit.	Code No.	Degrees Centigrade.	Degrees Fahrenheit.	Code No.
—15.0	5.0	00	10.0	50.0	50
—14.5	5.9	01	10.5	50.9	51
—14.0	6.8	02	11.0	51.8	52
—13.5	7.7	03	11.5	52.7	53
—13.0	8.6	04	12.0	53.6	54
—12.5	9.5	05	12.5	54.5	55
—12.0	10.4	06	13.0	55.4	56
—11.5	11.3	07	13.5	56.3	57
—11.0	12.2	08	14.0	57.2	58
—10.5	13.1	09	14.5	58.1	59
—10.0	14.0	10	15.0	59.0	60
— 9.5	14.9	11	15.5	59.9	61
— 9.0	15.8	12	16.0	60.8	62
— 8.5	16.7	13	16.5	61.7	63
— 8.0	17.6	14	17.0	62.6	64
— 7.5	18.5	15	17.5	63.5	65
— 7.0	19.4	16	18.0	64.4	66
— 6.5	20.3	17	18.5	65.3	67
— 6.0	21.2	18	19.0	66.2	68
— 5.5	22.1	19	19.5	67.1	69
— 5.0	23.0	20	20.0	68.0	70
— 4.5	23.9	21	20.5	68.9	71
— 4.0	24.8	22	21.0	69.8	72
— 3.5	25.7	23	21.5	70.7	73
— 3.0	26.6	24	22.0	71.6	74
— 2.5	27.5	25	22.5	72.5	75
— 2.0	28.4	26	23.0	73.4	76
— 1.5	29.3	27	23.5	74.3	77
— 1.0	30.2	28	24.0	75.2	78
— 0.5	31.1	29	24.5	76.1	79
0.0	32.0	30	25.0	77.0	80
0.5	32.9	31	25.5	77.9	81
1.0	33.8	32	26.0	78.8	82
1.5	34.7	33	26.5	79.7	83
2.0	35.6	34	27.0	80.6	84
2.5	36.5	35	27.5	81.5	85
3.0	37.4	36	28.0	82.4	86
3.5	38.3	37	28.5	83.3	87
4.0	39.2	38	29.0	84.2	88
4.5	40.1	39	29.5	85.1	89
5.0	41.0	40	30.0	86.0	90
5.5	41.9	41	30.5	86.9	91
6.0	42.8	42	31.0	87.8	92
6.5	43.7	43	31.5	88.7	93
7.0	44.6	44	32.0	89.6	94
7.5	45.5	45	32.5	90.5	95
8.0	46.4	46	33.0	91.4	96
8.5	47.3	47	33.5	92.3	97
9.0	48.2	48	34.0	93.2	98
9.5	49.1	49	34.5	94.1	99

Code X.—Barometric Tendency.

By the “barometric tendency at a given hour” is meant the amount by which the barometric height has changed during the preceding three hours. It is to be expressed in millimetres. For example, the barometric tendency at 8 a.m. could be obtained by comparing the reading taken at that hour, say 755·7 mm., with a reading taken at 5 a.m., say 759·3 mm. In this case the barometric tendency would be expressed by a fall of 3·6 millimetres. As a general rule the barometric tendency is to be determined from the trace of the barograph.

The barometric tendency is coded in two figures, according to the following table:—

Rise in Barometer.		Code No.	Fall in Barometer.		Code No.
Millimetres	Inches.		Millimetres.	Inches.	
0·0—0·4	0·00—0·01	01	0·0—0·4	0·00—0·01	51
0·5—0·9	0·02—0·03	02	0·5—0·9	0·02—0·03	52
1·0—1·4	0·04—0·05	03	1·0—1·4	0·04—0·05	53
1·5—1·9	0·06—0·07	04	1·5—1·9	0·06—0·07	54
2·0—2·4	0·08—0·09	05	2·0—2·4	0·08—0·09	55
2·5—2·9	0·10—0·11	06	2·5—2·9	0·10—0·11	56
3·0—3·4	0·12—0·13	07	3·0—3·4	0·12—0·13	57
3·5—3·9	0·14—0·15	08	3·5—3·9	0·14—0·15	58
4·0—4·4	0·16—0·17	09	4·0—4·4	0·16—0·17	59
4·5—4·9	0·18—0·19	10	4·5—4·9	0·18—0·19	60
5·0—5·4	0·20—0·21	11	5·0—5·4	0·20—0·21	61
5·5—5·9	0·22—0·23	12	5·5—5·9	0·22—0·23	62
6·0—6·4	0·24—0·25	13	6·0—6·4	0·24—0·25	63
6·5—6·9	0·26—0·27	14	6·5—6·9	0·26—0·27	64
7·0—7·4	0·28—0·29	15	7·0—7·4	0·28—0·29	65
7·5—7·9	0·30—0·31	16	7·5—7·9	0·30—0·31	66
8·0—8·4	0·32—0·33	17	8·0—8·4	0·32—0·33	67
8·5—8·9	0·34—0·35	18	8·5—8·9	0·34—0·35	68
9·0—9·4	0·36—0·37	19	9·0—9·4	0·36—0·37	69
9·5—9·9	0·38—0·38	20	9·5—9·9	0·38—0·38	70
10·0—10·4	0·39—0·40	21	10·0—10·4	0·39—0·40	71
10·5—10·9	0·41—0·42	22	10·5—10·9	0·41—0·42	72
11·0—11·4	0·43—0·44	23	11·0—11·4	0·43—0·44	73
11·5—11·9	0·45—0·46	24	11·5—11·9	0·45—0·46	74
12·0—12·4	0·47—0·48	25	12·0—12·4	0·47—0·48	75
12·5—12·9	0·49—0·50	26	12·5—12·9	0·49—0·50	76
13·0—13·4	0·51—0·52	27	13·0—13·4	0·51—0·52	77
13·5—13·9	0·53—0·54	28	13·5—13·9	0·53—0·54	78
14·0—14·4	0·55—0·56	29	14·0—14·4	0·55—0·56	79
14·5—14·9	0·57—0·58	30	14·5—14·9	0·57—0·58	80
15·0—15·4	0·59—0·60	31	15·0—15·4	0·59—0·60	81
15·5—15·9	0·61—0·62	32	15·5—15·9	0·61—0·62	82

BAROMETRIC TENDENCY TABLE—*continued*.

Rise in Barometer.		Code No.	Fall in Barometer.		Code No.
Millimetres.	Inches.		Millimetres.	Inches.	
16.0—16.4	0.63—0.64	33	16.0—16.4	0.63—0.64	83
16.5—16.9	0.65—0.66	34	16.5—16.9	0.65—0.66	84
17.0—17.4	0.67—0.68	35	17.0—17.4	0.67—0.68	85
17.5—17.9	0.69—0.70	36	17.5—17.9	0.69—0.70	86
18.0—18.4	0.71—0.72	37	18.0—18.4	0.71—0.72	87
18.5—18.9	0.73—0.74	38	18.5—18.9	0.73—0.74	88
19.0—19.4	0.75—0.76	39	19.0—19.4	0.75—0.76	89
19.5—19.9	0.77—0.78	40	19.5—19.9	0.77—0.78	90
20.0—20.4	0.79—0.80	41	20.0—20.4	0.79—0.80	91
20.5—20.9	0.81—0.82	42	20.5—20.9	0.81—0.82	92
21.0—21.4	0.83—0.84	43	21.0—21.4	0.83—0.84	93
21.5—21.9	0.85—0.86	44	21.5—21.9	0.85—0.86	94
22.0—22.4	0.87—0.88	45	22.0—22.4	0.87—0.88	95
22.5—22.9	0.89—0.90	46	22.5—22.9	0.89—0.90	96
23.0—23.4	0.91—0.92	47	23.0—23.4	0.91—0.92	97
23.5—23.9	0.93—0.94	48	23.5—23.9	0.93—0.94	98
24.0—24.4	0.95—0.96	49	The barometric tendency cannot be reported.		99

Code XI.—*Sea Surface Temperature.*

Sea surface temperature to tenths of a degree Centigrade is coded by three figures, or, when necessary, by two figures preceded by zero. If the temperature is negative, the first of these three figures is 5.

For example:—

– 2.2° C. is coded as 522.

+ 1.0° C. ,, 010.

+ 15.6° C. ,, 156.

Table of Corrections for reducing Barometric Heights to 0° C. and to Sea Level.

NOTE.—The barometric reading should first be corrected for index error. This error may be neglected if it is less than 0.3 mm.

The + sign indicates that the correction is to be *added* to the barometric reading.

The – sign indicates that the correction is to be *subtracted*.

SEA SURFACE TEMPERATURE.

Temperature by the thermometer at the attached barometer.		-4° C. 24.8° F.	-2° C. 28.4° F.	0° C. 32° F.	+2° C. 35.6° F.	4° C. 39.2° F.	6° C. 42.8° F.	8° C. 46.4° F.	10° C. 50° F.	12° C. 53.6° F.	14° C. 57.2° F.	16° C. 60.8° F.	18° C. 64.4° F.	20° C. 68° F.	22° C. 71.6° F.	24° C. 75.2° F.	26° C. 78.8° F.	28° C. 82.4° F.
Corrections to be made.																		
M'tres.	Ft. In.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.
0	0	+0.5	+0.3	0.0	-0.2	-0.5	-0.7	-1.0	-1.2	-1.5	-1.7	-2.0	-2.2	-2.5	-2.7	-3.0	-3.2	-3.5
1	3	+0.6	0.4	+0.1	0.1	0.4	0.6	0.9	1.1	1.4	1.6	1.9	2.1	2.4	2.6	2.9	3.1	3.4
2	6	+0.8	0.5	0.3	0.0	0.3	0.5	0.7	1.0	1.2	1.5	1.7	2.0	2.2	2.5	2.8	2.9	3.2
3	9	+0.9	0.6	0.4	+0.1	0.1	0.4	0.6	0.9	1.1	1.4	1.6	1.9	2.1	2.4	2.6	2.9	3.1
4	13	+1.0	0.8	0.5	0.2	0.0	0.3	0.5	0.8	1.0	1.2	1.5	1.7	2.0	2.2	2.5	2.8	3.0
5	16	+1.2	0.9	0.7	0.4	+0.1	0.1	0.4	0.6	0.9	1.1	1.4	1.6	1.9	2.1	2.4	2.7	2.9
6	19	+1.3	1.0	0.8	0.5	0.2	0.0	0.3	0.5	0.8	1.0	1.3	1.5	1.8	2.0	2.3	2.6	2.8
7	22	+1.4	1.2	0.9	0.6	0.3	+0.1	0.1	0.4	0.6	0.9	1.1	1.4	1.6	1.9	2.2	2.4	2.7
8	26	+1.5	1.3	1.0	0.7	0.5	0.2	0.0	0.3	0.5	0.8	1.0	1.3	1.5	1.8	2.1	2.3	2.6
9	29	+1.7	1.4	1.2	0.8	0.6	0.3	0.2	0.0	0.3	0.6	0.9	1.1	1.4	1.6	2.0	2.2	2.5
10	32	+1.8	1.6	1.3	1.0	0.7	0.5	0.3	0.2	0.3	0.4	0.7	0.9	1.2	1.4	1.8	2.1	2.4
11	36	+1.9	1.7	1.4	1.1	0.8	0.6	0.3	+0.1	0.2	0.4	0.7	0.9	1.2	1.4	1.8	2.2	2.5
12	39	+2.0	1.8	1.5	1.2	1.0	0.7	0.5	0.2	0.0	0.3	0.5	0.8	1.1	1.3	1.6	1.9	2.1
13	42	+2.2	1.9	1.7	1.3	1.1	0.8	0.6	0.3	0.2	0.0	0.3	0.6	0.8	1.1	1.4	1.6	1.9
14	45	+2.3	2.0	1.8	1.5	1.2	0.9	0.7	0.4	0.3	+0.1	0.2	0.5	0.7	1.0	1.3	1.5	1.8
15	49	+2.4	2.2	1.9	1.7	1.4	1.1	0.8	0.6	0.3	0.2	0.1	0.4	0.6	0.9	1.2	1.4	1.6
16	52	+2.5	2.3	2.0	1.7	1.5	1.2	0.9	0.7	0.4	0.2	0.1	0.4	0.6	0.8	1.0	1.3	1.5
17	55	+2.6	2.4	2.1	1.9	1.6	1.3	1.1	0.8	0.6	0.3	+0.1	0.1	0.5	0.8	0.9	1.2	1.4
18	59	+2.8	2.5	2.3	2.0	1.7	1.4	1.2	0.9	0.7	0.4	0.2	0.0	0.4	0.6	0.9	1.2	1.4
19	62	+2.9	2.6	2.4	2.1	1.9	1.5	1.3	1.0	0.8	0.6	0.3	0.0	0.3	0.5	0.8	1.0	1.3
20	65	+3.0	2.8	2.5	2.3	2.0	1.7	1.4	1.2	0.9	0.7	0.4	+0.1	0.2	0.4	0.7	0.9	1.2
21	68	+3.1	2.9	2.6	2.4	2.1	1.8	1.5	1.3	1.0	0.8	0.5	0.2	0.1	0.3	0.6	0.8	1.1
22	72	+3.3	3.0	2.8	2.5	2.2	1.9	1.7	1.4	1.2	0.9	0.6	0.3	+0.1	0.2	0.4	0.7	0.9
23	75	+3.4	3.1	2.9	2.6	2.4	2.1	1.8	1.5	1.3	1.0	0.8	0.4	0.2	0.1	0.3	0.6	0.8

Height of barometer cistern above sea level

Table for converting barometric readings in inches into millimetres.

Inches and Tenths	Hundredths of an Inch.									
	0.	1.	2.	3.	4.	5.	6.	7.	8.	9.
	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.
27.0	685.8	686.0	686.3	686.6	686.8	687.1	687.3	687.6	687.8	688.1
.1	688.3	688.6	688.8	689.1	689.3	689.6	689.9	690.1	690.4	690.6
.2	690.9	691.1	691.4	691.6	691.9	692.1	692.4	692.7	692.9	693.2
.3	693.4	693.7	693.9	694.2	694.4	694.7	694.9	695.2	695.4	695.7
.4	696.0	696.2	696.5	696.7	697.0	697.2	697.5	697.7	697.9	698.2
.5	698.5	698.7	699.0	699.3	699.5	699.8	700.1	700.3	700.5	700.8
.6	701.0	701.3	701.5	701.8	702.0	702.3	702.6	702.8	703.1	703.3
.7	703.6	703.8	704.1	704.3	704.6	704.8	705.1	705.4	705.6	705.9
.8	706.1	706.4	706.6	706.9	707.1	707.4	707.6	707.9	708.1	708.4
.9	708.7	708.9	709.2	709.4	709.7	709.9	710.2	710.4	710.7	710.9
28.0	711.2	711.4	711.7	712.0	712.2	712.5	712.7	713.0	713.2	713.5
.1	713.7	714.0	714.2	714.5	714.7	715.0	715.3	715.5	715.8	716.0
.2	716.3	716.5	716.8	717.1	717.3	717.5	717.8	718.0	718.3	718.6
.3	718.8	719.1	719.3	719.6	719.8	720.1	720.3	720.6	720.8	721.1
.4	721.4	721.6	721.9	722.1	722.4	722.6	722.9	723.1	723.4	723.6
.5	723.9	724.1	724.4	724.7	724.9	725.2	725.4	725.7	725.9	726.2
.6	726.4	726.7	726.9	727.2	727.4	727.7	728.0	728.2	728.5	728.7
.7	729.0	729.2	729.5	729.7	729.9	730.2	730.5	730.7	731.0	731.3
.8	731.5	731.8	732.0	732.3	732.5	732.8	733.0	733.3	733.5	733.8
.9	734.1	734.3	734.6	734.8	735.1	735.3	735.6	735.8	736.1	736.3
29.0	736.6	736.8	737.1	737.4	737.6	737.9	738.1	738.4	738.6	738.9
.1	739.1	739.4	739.6	739.9	740.1	740.4	740.7	740.9	741.2	741.4
.2	741.7	741.9	742.2	742.4	742.7	742.9	743.2	743.4	743.7	744.0
.3	744.2	744.5	744.7	745.0	745.2	745.5	745.7	745.9	746.2	746.5
.4	746.8	747.0	747.3	747.5	747.7	748.1	748.3	748.5	748.8	749.0
.5	749.3	749.5	749.8	750.1	750.3	750.6	750.8	751.1	751.3	751.6
.6	751.8	752.1	752.3	752.6	752.8	753.1	753.4	753.6	753.9	754.1
.7	754.4	754.6	754.8	755.1	755.4	755.6	755.9	756.1	756.4	756.7
.8	756.9	757.2	757.4	757.7	757.9	758.2	758.4	758.7	758.9	759.2
.9	759.5	759.7	760.0	760.2	760.5	760.7	761.0	761.2	761.5	761.7
30.0	762.0	762.2	762.5	762.8	763.0	763.3	763.5	763.8	764.0	764.3
.1	764.5	764.8	765.0	765.3	765.5	765.8	766.1	766.3	766.6	766.8
.2	767.1	767.3	767.6	767.8	768.1	768.3	768.6	768.8	769.1	769.4
.3	769.6	769.9	770.1	770.4	770.6	770.9	771.1	771.4	771.6	771.9
.4	772.2	772.4	772.7	772.9	773.2	773.4	773.7	773.9	774.2	774.4
.5	774.7	774.9	775.2	775.5	775.7	776.0	776.2	776.5	776.7	777.0
.6	777.2	777.5	777.7	778.0	778.2	778.5	778.8	779.0	779.3	779.5
.7	779.8	780.0	780.3	780.5	780.8	781.0	781.3	781.5	781.8	782.1
.8	782.3	782.6	782.8	783.1	783.3	783.6	783.8	784.1	784.3	784.6
.9	784.9	785.1	785.4	785.6	785.9	786.2	786.4	786.6	786.9	787.1
31.0	787.4	787.6	787.9	788.2	788.4	788.7	788.9	789.2	789.4	789.7
.1	789.9	790.2	790.4	790.7	790.9	791.2	791.5	791.7	792.0	792.2
.2	792.5	792.7	793.0	793.2	793.5	793.7	794.0	794.2	794.5	794.8
.3	795.1	795.3	795.5	795.8	796.0	796.3	796.5	796.8	797.0	797.3
.4	797.6	797.8	798.1	798.3	798.6	798.8	799.1	799.3	799.6	799.8

Table for converting Minutes to tenths of a Degree.

Minutes.							Tenths of a degree.
0-3	...	...	...	...	...	...	0
4-9	...	...	...	...	...	...	1
10-15	...	...	...	...	...	...	2
16-21	...	...	...	...	...	...	3
22-27	...	...	...	...	...	...	4
28-33	...	...	...	...	...	...	5
34-39	...	...	...	...	...	...	6
40-45	...	...	...	...	...	...	7
46-51	...	...	...	...	...	...	8
52-57	...	...	...	...	...	...	9
58-59	...	...	...	...	...	...	10

EXAMPLE.

Message containing Meteorological Information.

Ice :

—	First Message.	Coded as	Second Message.	Coded as
Date of observation	21	21	22	22
Time of observation	1 p.m.—4 p.m.	5	4 a.m.—7 a.m.	2
Nature of ice or derelict	Single iceberg	1	Field ice	5
Position of ice or derelict ... {	Latitude 44° 35'	446	Latitude 42° 58'	430
	Longitude 43° 15'	432	Longitude 47° 3'	470

Weather :

—	First Message.	Coded as	Second Message.	Coded as
Date of observation	21	21	22	22
Position of ship {	Latitude 45° 13'	825	Latitude 43° 47'	863
	Longitude 42° 5'		Longitude 46° 33'	
Direction and force of wind	E.S.E. 5	26	S.W. 2	55
Set and velocity of current	N.W. 2 m-h	82	S.S.E. 1 m-h.	39
Weather	Sky clear	0	Fog	8
Barometer	765.3 mm.	653	753.2 mm.	532
Air temperature	15.3° C.	61	9.8° C.	50
Barometric tendency	Rise .8	02	Fall 2.7	56
Sea-surface temperature	14° C.	014	— .7° C.	507

The Code of the above message sent to the Meteorological Office would thus be:—

Meteorology: Ice 21514, 46432: 22254, 30470: Weather; 21825, 26820, 65361, 02014: 22863, 55398, 53250, 56507.

ARTICLE II.

SAFETY SIGNAL.

The radiotelegraph stations which have to transmit to ships information involving safety of navigation and being of an urgent character (icebergs, derelicts, cyclones, typhoons, sudden changes

in the position or form of fixed obstructions or of land marks) shall make use of the following signal, called the safety signal, repeated at short intervals ten times at full power :

— — — (T T T)

In principle, all radiotelegraph stations receiving the safety signal, shall, if the transmission of messages by them would interfere with the receipt by any other station of the safety signal and the following safety message, keep silence, in order to allow all interested stations to receive that message. This does not apply to cases of distress.

The safety message shall be transmitted one minute after the safety signal has been sent out, and shall be repeated thereafter three times at intervals of ten minutes.

The Governments of the Contracting States will select the stations which are to send out to mariners safety information of an urgent character.

When the information in question has been sent out by stations performing the time service, it shall be again sent out after the transmission of the time signal and the weather report.

ARTICLE III.

MORSE CODE.

INTERNATIONAL SIGNALS.

These signals may be made at night or in thick weather, either by long and short flashes of light, or by long and short sound signals (whistles, fog-horns, etc.), or during the day by hand flags.

1.—URGENT AND IMPORTANT SIGNALS.

You are standing into danger ...	...	...	---
I want assistance; remain by me ...	...	...	---—
Have encountered ice ...	...	...	---—
Your lights are out (<i>or</i> , burning badly) ...	...	---	---
The way is off my ship; you may feel your way			
past me ...	...	...	---
Stop (<i>or</i> , heave to); I have something impor-			
tant to communicate ...	...	...	--- --
Am disabled; communicate with me ...	...	---	---

2.—GENERAL SIGNALS.

Meaning.	Signal.	Equivalent Letters and How Made.	How Answered.
Preparative ...	----- &c.	A succession of E's in one group	By the general answer T.
Answer ...	—	T (singly).	
Spelling ...	-----	F F in one group.	By the general answer T.
Use International Code of Signals.	-----	M M M in one group.	By the general answer T.
International Code Flag Sign.	-----	M M in one group.	
Break sign ...	-- --	I I as separate letters.	
Stop ...	-- -- --	I I I as separate letters.	
Finish of the message.	-----	V E as one group.	- - - R. - - - D. As separate letters.
Erase sign ...	- - - - &c.	A succession of E's as separate letters.	By a succession of E's as separate letters.
Annul ...	W W -----	W W as one group.	By W W as one group.
Repeat word after— (when a single word is required).	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> <div style="display: flex; flex-direction: column; align-items: center;"> <div>I M I</div> <div>-----</div> <div>W A</div> <div>-----</div> </div> <div style="font-size: 2em;">}</div> </div> <div> Followed by the word preceding the one required. </div> </div>	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> <div style="display: flex; flex-direction: column; align-items: center;"> <div>I M I as one group.</div> <div>W A as separate letters</div> </div> <div style="font-size: 2em;">}</div> </div> </div>	By the general answer T.
Repeat all after— (if more than one word is required)	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> <div style="display: flex; flex-direction: column; align-items: center;"> <div>I M I</div> <div>-----</div> <div>A A</div> <div>-----</div> </div> <div style="font-size: 2em;">}</div> </div> </div>	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> <div style="display: flex; flex-direction: column; align-items: center;"> <div>I M I as one group.</div> <div>A A as separate letters.</div> </div> <div style="font-size: 2em;">}</div> </div> </div>	By the general answer T.
Repeat all— (if the whole message is to be repeated.)	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> <div style="display: flex; flex-direction: column; align-items: center;"> <div>I M I</div> <div>-----</div> <div>A L L</div> <div>-----</div> </div> <div style="font-size: 2em;">}</div> </div> </div>	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> <div style="display: flex; flex-direction: column; align-items: center;"> <div>I M I as one group.</div> <div>A L L as separate letters.</div> </div> <div style="font-size: 2em;">}</div> </div> </div>	By the general answer T.

3.—NATIONALITY SIGNALS.

Meaning.	Signal.	Equivalent Letters and How Made.
American ...	— — — — —	C D as separate letters.
Argentine ...	— — — — —	C G " "
Austro-Hungarian ...	— — — — —	C F " "
Belgian ...	— — — — —	D C " "
Brazilian ...	— — — — —	D E " "
British ...	— — — — —	F.
Bulgarian ...	— — — — —	D F as separate letters
Chilian ...	— — — — —	D G " "
Chinese ...	— — — — —	E C " "
Colombian ...	— — — — —	E D " "
Danish ...	— — — — —	E F " "
Dutch ...	— — — — —	E G " "
French ...	— — — — —	E.
German ...	— — — — —	G.
Greek... ...	— — — — —	M M in one group followed by D.
Italian ...	— — — — —	C E as separate letters.
Japanese ...	— — — — —	C.
Mexican ...	— — — — —	F C as separate letters.
Norwegian ...	— — — — —	M M in one group followed by C.
Peruvian ...	— — — — —	F D as separate letters.
Portuguese ...	— — — — —	F E " "
Russian ...	— — — — —	D.
Siamese ...	— — — — —	F G as separate letters.
Spanish ...	— — — — —	G C " "
Swedish ...	— — — — —	M M in one group followed by E.
Turkish ...	— — — — —	G D as separate letters
Uruguayan ...	— — — — —	G E " "
Venezuelan ...	— — — — —	G F " "

4.—INSTRUCTIONS.

1. THE URGENT AND IMPORTANT SIGNALS may be made without the Preparative Signal being answered if it is supposed that the person addressed cannot reply, or in other special circumstances; but in this case a pause should be made between the Preparative Signal and the message.

2. THE SIGNAL — — — — — (FF) is used previous to any letters which are intended to spell words.

3. THE SIGNAL — — — — — (MMM) is used previous to any message sent by means of the International Code of Signals.

4. THE SIGNAL — — — — — (MM) means the Code Flag of the International Code of Signals, and is used as indicated in the Code Book.

5. THE BREAK SIGN is used between the address of the receiver and the text of the message, and after the message if the name of the sender is to be signalled.

6. THE STOP is used, where necessary, in the text of the signal.

7. THE ERASE is used to cancel the last word or signal group, sent by mistake.

8. THE ANNUL is used to cancel *all* the message.

9. METHOD OF ANSWERING. Each word or signal group, when understood, is to be answered by one long flash — (T).

If a word or signal group is not answered, the sender is to repeat it until answered by a long flash.

At the end of the message, if understood, the receiver will make - — - — - (RD).

The Erase and Annul signs are to be answered by their own signs.

10. THE NATIONALITY SIGNAL is made immediately after the answer to the Preparatory Signal has been received, to indicate the nationality of the vessel making the signal. It is answered by the nationality signal of the vessel receiving the message.

SAFETY CERTIFICATE.

Radiotelegraph installation :—

—		Class and numbers required by Articles 33 and 34 of the said Convention.	Actual class and numbers.
Class of ship :—		...	...
Number of {	Operators of the 1st Class ...	...	...
	2nd , ...	...	...
	Certificated Watchers ...	—	...

III. That in all other respects the ship complies with the requirements of the said Convention, so far as those requirements apply thereto.

This certificate is issued under the authority of the Government. It will remain in force until

The undersigned declares that he is duly authorised by the said Government to issue this certificate.

(Signature)

Issued at the day of



THE AMERICAN WIRELESS STATION AT COLON (ISTHMI'US OF PANAMA) BY MOONLIGHT.

LAWS AND REGULATIONS

INDEX

NOTE.—The letters **A, B, C**, etc., preceding the various numbers in this index refer to the guide printed at the beginning of each country's laws. Thus in looking up information about operators in Great Britain, we turn to "Operators" in this index and look down the list of countries under that head till we come to "Great Britain." There we find the reference is **D14**, so we turn to the part of the laws and regulations headed "Great Britain" and consult the guide at the beginning of this part, which tells us that "**D**" is the form of licence for ship stations, and therefore "**D14**" means Section 14 of this licence. To facilitate reference, these guide letters, **A, B, C**, etc., are printed in the margin at the beginning of each law or regulation. Where a country has only one Act referred to, no such guide letters are needed, the number of section or paragraph alone being referred to in such cases.

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Great Britain	F 1; G 16 (3).
Norway	D 9.
Spain	C 13 (2).
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Brazil	E Chap. II.
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Hungary	13.
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Denmark	C 2.
East Africa Protectorate ..	6 (2).
Fiji	B 4.
Gambia	B 3.
Gibraltar	C 4.
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China (Hong Kong)	B 1 and 3.
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Fiji	B 1.
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Gambia	B 1 and 2.
Germany	B 1.
Gibraltar	C 1.
Gold Coast Colony	B 1 and 2.
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St. Lucia	B 1.
St. Vincent	B 1.
Sierra Leone	B 1.
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Falkland Islands	2.
Fiji	C 3.
Gambia	B 1 and 2.
Gibraltar	B 2 ; C 2.
Gold Coast Colony	A 4 ; B (III.).
Great Britain	C 4 ; D (II.).
Hungary	E 2.
India	D 3 and 4.
Italy	B Sec. 5, Par. 19.
Jamaica	D 4 and 5.
Japan	A Arts. 3-5 ; D Art. 20.
Mauritius	3.
New Zealand	C 4 ; D 8.
Nigeria (Southern)	A 4 ; B (III.).
Norway	E 8 and 4 ; E 1-3.
St. Helena	B 2.
St. Lucia	A 4 ; B 3 ; C 1-3.
St. Vincent	A 4 ; B 3.
Siam	6.
Sierra Leone	A 3 and 4 ; B 3.
Somaliland	A 4 ; B (III.) ; C .
Straits Settlements	B 2.
Sudan	<i>See under</i> Egypt, Clause 1.
Sweden	B 1 ; C and D Preamble.
Trinidad and Tobago	A 2 ; B 1 and 2 ; C 2.
United States of America	C Sec. 4 ; D 16-18 ; G .
Zanzibar	3

COMMUNICATION—(15) Retransmission.

Argentina	B Chap. II., Subsec. 6, Art. 3.
Brazil	E Art. 8, Sec. 3 and Art. 9, Sole par. E, Art. 28.
Japan	A 4; B Arts. 4-8.
Panama (Canal Zone) ..	C 44 and 45.
Spain	39 and 40.

COMMUNICATION—(16) Secrecy.

Argentina	B Chap. II., Subsec. 3, Art. 13.
Brazil	E Chap. VII., Art. 66.
Canada	A 6; B 75; D 9.
Ceylon	A 1; (B).
Curaçao	See Netherlands, D 11.
Denmark	B 7.
Germany	C 9.
Great Britain	D 13; E 9.
Newfoundland	D 9.
New Zealand	A 7; D 18.
Portugal	B 17, 22, and 23.
Siam	7.
United States of America ..	D 19.

COMMUNICATION—(17) Ship and Shore; Ship and Ship. *See also* "COMMUNICATION" (Compulsory Interchange of Radiograms).

Argentina	B Chap. II., Subsec. 9, Arts. 8 and 13, also Subsec. 9, Art. 11.
Australia	B 12.
Brazil	E Arts. 40-42.
Canada	D 5 and 6.
Germany	B 1 and 2; C 14.
Hungary	13.
India	D 5.
Japan	A Art. 2, Par. (iv.).
Panama (Canal Zone) ..	A 17.
Sweden	B 1-4.
United States of America ..	D 17.
Zanzibar	3.

COMPENSATION—*see* "FINANCE" (Compensation).

COMPULSORY INSTALLATION—*see* "SHIP STATIONS" (Compulsory Installation).

COMPULSORY INTERCOMMUNICATION—*see* "COMMUNICATION" (Compulsory Interchange of Radiograms).

COMPULSORY LICENCE—*see* "LICENCES" (General).

CONFISCATION—*see* "ADMINISTRATION" (Enforcement of Law, Penalties).

CONTRACTS—*see* "LICENCES."

CONTROL BY STATE—*see* "ADMINISTRATION" (Executive Authorities and their Powers).

CONVENTIONS (International)—*see* "INTERNATIONAL CONVENTIONS."

CO-OPERATION WITH LAND LINES AND CABLES—see “COMMUNICATION” (Co-operation with Land Lines and Cables).

CUSTOMS AUTHORITIES (Detention by)—see “ADMINISTRATION” (Enforcement of Law).

DAMPING—see “SHIP STATIONS” (Requirements of Installation).

DEPOSITS—see “FINANCE” (Deposits, etc.).

DETENTION OF SHIPS—see “ADMINISTRATION” (Enforcement of the Law).

DETERMINATION OF LICENCE—see “LICENCES” (Revocation).

DISASTERS AND WRECKS (Information of)—see “COMMUNICATION” (Distress Signals).

DISTRESS SIGNALS—see “COMMUNICATION” (Distress Signals).

DOCUMENTS (Serving of)—see “ADMINISTRATION” (Enforcement of the Law).

DOCUMENTS TO BE CARRIED—see “SHIP STATIONS” (Documents to be Carried).

EDUCATIONAL STATIONS—see “STATIONS” (Educational or Technical).

EMERGENCIES.

Argentina	..	..	..	B Chap. II., Subsec. 8, Art. 5.
Australia	..	..	..	B 17 and 18; D 1.
Austria	..	..	..	B (5) (11).
Barbados	..	..	..	C 3.
Bermuda	..	..	..	B 2.
Brazil	..	..	..	E Sec. 9.
Canada	..	..	..	A 13; B 4 and 5; D 17.
Ceylon	..	..	..	A (i.); B 6.
China (Hong Kong)	..	..	..	B 5.
China (Weihaiwei)	..	..	..	6 (v.).
Chinese Republic	..	..	..	4 and 5.
Curaçao	..	..	..	See Netherlands, D 6.
Denmark	..	..	..	B 22.
Fiji	..	..	..	B; C.
France and Algeria	..	..	..	B Art 6.
Gambia	..	..	..	A VI.
Germany	..	..	..	C 7.
Gibraltar	..	..	..	C 3.
Gold Coast Colony	..	..	..	A 5 (3).
Great Britain	..	..	..	C 5 (1); D (i.), (d), D 22 (1); H.
Hungary	..	..	..	9.
India	..	..	..	E 17.
Italy	..	..	..	A 1.
Jamaica	..	..	..	D 4.
Newfoundland	..	..	..	A Clause 1 (1).
New Zealand	..	..	..	C 6 and 7; D 24.
Nigeria (Southern)	..	..	..	A 5 (3).
Norway	..	..	..	D 14.
St. Helena	..	..	..	B 3.

Emergencies—(*Continued.*)

St. Lucia .. ..	..	A 5 (a); C 1-3.
St. Vincent .. ..	..	A 5 (3).
Sierra Leone .. ..	..	A 5 (3).
Somaliland Protectorate ..	..	A 5 (3).
Spain .. ..	..	F.
Straits Settlements ..	..	B 3.
Trinidad and Tobago ..	..	C 3.
United States of America ..	..	B Sec. 3, Par. 5; G.

EMERGENCY APPARATUS—see “SHIP STATIONS” (Auxiliary Apparatus).

ENERGY TO BE USED—see “SHIP STATIONS” (Requirements of Installation); see also “COMMUNICATION” (Interference).

ENFORCEMENT OF THE LAW—see “ADMINISTRATION” (Enforcement of the Law).

ERECTION OF STATIONS—see “STATIONS” (General).

ESTABLISHMENT OF STATIONS—see “STATIONS” (General).

EXECUTIVE AUTHORITIES—see “ADMINISTRATION” (Executive Authorities).

EXEMPTIONS FROM LICENCE—see “LICENCES” (General).

EXEMPTIONS FROM LICENCE FEES, TAXES, etc.—see “EXPERIMENT STATIONS”; see also “FINANCE” (Licences, Fees, etc.).

EXEMPTIONS FROM REGULATIONS OR ACT—see “ACT” (Application of).

EXERCISES—see “COMMUNICATION” (Exercises).

EXPENSES—see “FINANCE.”

EXPERIMENTS—see “STATIONS” (Experiment Stations).

FALSE SIGNALS—see “COMMUNICATION” (Distress Signals).

FEES—see “FINANCE” (Licences, Fees, etc.).

FINANCE—(1) Accounts.

Argentina .. ..	..	B Chap. II., Subsec. 10.
Brazil .. ..	..	E Chap. VI., Arts. 58-60; G Art. 23.
Denmark .. ..	..	B 20.
Great Britain .. ..	..	D; E 15.
Hungary .. ..	..	14.
Japan .. ..	..	B 14.
New Zealand .. ..	..	D 19.
Spain .. ..	..	C 36 and 37.

FINANCE—(2) Administrative Expenses.

Argentina .. ..	..	B Chap. II., Subsec. 10, Arts 1-19.
Brazil .. ..	..	H.
Italy .. ..	..	B 6.

FINANCE—(3) Compensation (Indemnities).

Argentina	B Chap. II., Subsec. 4, Art. 1 (c), (d); also Art 2 (b).
Australia	B 27.
Canada	D 7 (II.) and 17 (III.).
Chinese Republic	7, 13, 14, 15, 18, and 19.
Great Britain	D 11; E 7 and 11 (II.).
Hungary	15 and 20.
Newfoundland	D 17 (III.).
Norway	D 15.

FINANCE—(4) Communication Charges.

Argentina	B Chap. II., Subsec. 10.
Austria	B 8 and 10; E 8 and 9.
Brazil	B ; E Chap. 5, Arts. 55-57.
Canada	D 2 (II.).
Chinese Republic	16.
Denmark	B 16-18.
Great Britain	D 12 (II.); E 2 (II.).
Holland	See Netherlands.
Hungary	11, 12, and 19.
India	E Preamble (III.) and 8 (II.).
Italy	B 20.
Japan	B 11-16; C Arts 2-4.
Netherlands	C 2.
New Zealand	D 26.
Panama (Canal Zone)	C 49.
Spain	C 22-27.

FINANCE—(5) Deposits, Licence Fees, Rents, Royalties, Taxes.

Argentina	A 6; B Chap. III., Subsec. 9, Art. (b).
Australia	B 5 and 18 (III.).
Austria	7.
British Honduras	A 2; B (v.).
Canada	B Pars. 1-3.
Ceylon	A 1 (d); B 2.
China (Hong Kong)	A 7; B 2.
China (Weihaiwei)	7.
Denmark	A 6; B 16, Par. 3, 18 and 23.
France and Algeria	7.
Gambia	A ; V., VIII.
Great Britain	A 1 (6); D 20; E 12.
Hungary	15.
Italy	B 9 (f), 13-16.
Malaya... .. .	A 6.
New Zealand	D 22.
Norway	D 12.
Portugal	B 8.
Rhodesia (Southern)	A 5; B .
Spain	D Art. 12.

FINANCE—(6) Installation and Working Expenses.

Austria	E 4-6.
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FOREIGN MESSAGES—see "COMMUNICATION" (International Service).

FOREIGN SHIPS.

Argentina	B Chap. II., Subsec. 8, Art. 7 and Subsec. 9, Art. 4 (d).
Australia	B 2, 14, and 15.
Austria	A (5).
Brazil	G Art. 6.
Belgium	5.
Denmark	A 2; B 21 and 22.
Fiji	A 4.
Gambia	B 1 and 2.
Germany	A 2, 3 (b); B 1-4; E (a) (b).
Great Britain	A 3 (4); C 1-9.
New Zealand	C Preamble; Pars. 1 and 2.
Norway	A 1; C 1-5; E 4 and 5.
Siam	6.
Spain	B 11, 31, and 32.
Sweden	B 1-5.
United States of America	D Sec. 8.

FORFEITURE—see "ADMINISTRATION" (Enforcement of the Law, Penalties).

FORM OF LICENCE—see "LICENCES" (Form of).

FORMS, MESSAGE—see "COMMUNICATION" (Message Forms).

GOVERNMENT MESSAGES—see "COMMUNICATION" (Government Messages).

GOVERNMENT PREROGATIVES—see "ADMINISTRATION" (Executive Authorities and their Powers); see also "EMERGENCIES."

GOVERNMENT STATIONS—see "STATIONS" (Government, Naval and Military).

ILLEGAL ERECTION OR USE—see "ADMINISTRATION" (Enforcement of Law, Penalties).

IMPORTATION OF WIRELESS APPARATUS (Restrictions on).

Gibraltar	A.
Hungary	3.
Nigeria (Northern)	2.

INSPECTION—see "ADMINISTRATION" (Enforcement of Law).

INSTALLATIONS (Erection of)—see "STATIONS" (General).

INTERCHANGE OF RADIOGRAMS—see "COMMUNICATION" (Compulsory Interchange of Radiograms).

INTERFERENCE—see "COMMUNICATION" (Interference); see also "SHIP STATIONS" (Requirements of Installation).

INTERNATIONAL CONVENTION AND REGULATIONS (Applications of).

Argentina	B Chap. II., Subsec. 1, Art. 5, and Subsec. 3, Art. 10, also Subsec. 8, Arts. 9 and 10.
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International Convention and Regulations (Applications of)—(*Continued.*)

Australia	B 13.
Austria	B 10.
Brazil	E Art. 26, Sec. 4, Arts. 27, Chap. III., Preamble and <i>passim</i> .
Canada	C 3, 26, 41; D 6, 10, 13 (1) and 16.
Denmark	B Preamble, 9 and 20.
France and Algeria ..	A 7.
Great Britain	D (i.) (A); D (i.) (E); D 4, 6, 10 (1) and 12.
Hungary	2, 4, 14.
India	D 2; E 3 and 4.
Japan	C Art. 1.
New Zealand	D 4, 7, 10, 12.
Norway	C 5; D 1 and 3; E 5.
Siam	5 and 13.
Spain	B 7, 16, 20, 22, 31, 36, 41; E 1; F .
Sweden	B 3.
United State. of America ..	B Subdiv. 2, 2-4; F .
Uruguay	B 5.

INTERNATIONAL SERVICE—see “COMMUNICATION” (International Service).

INTERPRETATION OF ACT—see “ACT.”

INVENTIONS, ADOPTION OF NEW—see “SHIP STATIONS” (Requirements of Installation).

ISLE OF MAN—see “ACT” (Great Britain, **A** 5).

LAND STATIONS—see “STATIONS.”

LEGAL PROCEEDINGS—see “ADMINISTRATION” (Enforcement of Law).

LICENCES—(i) Application.

Argentina	B Chap. II., Subsec. 2.
Australia	B 6.
Austria	E 2.
Brazil	E Arts. 25 and 26.
Canada	C 1-7, 18, 76-79, 87, and 88.
Ceylon	B 1.
China (Hong Kong) ..	B 1.
China (Weihaiwei) ..	4.
Chinese Republic ..	3.
Denmark	B 3.
East Indies (Dutch) ..	See Netherlands, E
Fiji	A 3 (2).
Gambia	A IV.
Germany	C 4.
Great Britain	J 4.
Greece	B Art. 1.
India	B Art. 4.
Italy	B 9; D 6, 8, and 9.

Licences—(1) Application—(Continued.)

Japan	D Arts. 3, 5, 6, and 18.
Norway	C 1-3; D Preamble.
Rhodesia (Southern) .. .	B .
Spain	B 6.
United States of America ..	B Subdiv. 2, Art. 5, Par. 2; E Subdiv. C, Part II., and Sec. 3, Part II. (page 520); <i>also</i> Part IV., Pars. 1-2.

LICENCES—(2) Assignment.

Canada	D 14.
Great Britain	D 21; E 13.
Italy	B 10.
New Zealand	B 23.

LICENCES—(3) Fees.

Argentina	B Chap. II., Subsec. 9, Arts. 3 and 4.
Australia	B 5.
Austria	B 2.
Ceylon	B 2.
China (Hong Kong) .. .	B 2.
Great Britain	D 20; E 12.
Hungary	15.
Italy	B 9, 13-16.
New Zealand	C 22 (2) (3).
Rhodesia (Southern) .. .	A 5; B .

LICENCES—(4) Form of.

Argentina	B Chap. II., Subsec. 9, Art. 5.
Australia	C .
Austria	B .
Brazil	F .
Canada	D 1-20.
Great Britain	D ; E .
India	E .
Newfoundland	D .
Norway	D .
Switzerland	B .

LICENCES—(5) Regulations applicable to.

Canada	B 1-7; C 76-79.
East Africa Protectorate ..	9.
Great Britain	D 4-7; E 4.
India	D 9.
Italy	B Secs. 3 and 4.
Japan	A 24; E .
Newfoundland	B 1.
Norway	D 3.
Panama (Canal Zone) .. .	A Sec. 4, Par. 19, and Secs. 6 and 9.
United States of America ..	D 20.

LICENCES—(6) Renewal.

Australia	B 9.
Belgium	3.
Great Britain	E 12 (2).
Hungary	18.
India	D 13 (3).
Italy	B 7; D 8.
Japan	E 11.
New Zealand	D 22 (1).

LICENCES—(7) Revocation or Determination. See also "ADMINISTRATION" (Enforcement of Law, Penalties); see also "COMMUNICATION" (Interference).

Argentina	B Chap. II., Subsec. 9, Art. 12.
Australia	B 10.
Bermuda	A 2.
Canada	B 4 II.; D 18.
Germany	C 1 and 11.
Great Britain	D 13, 21, and 22; E 15 and 16.
Hungary	17 and 18.
India	13.
Italy	A 1; B 11.
Jamaica	C 4.
New Zealand	D 26.
Norway	D 16.

LICENCES, GENERAL (Permission to establish, work, or modify Installations). See also "SHIP STATIONS" (Licences).

Argentina	B Chap. II., Subsec. 2.
Australia	A 5 and 6; B 3-6, 8 and 9.
Austria	A 1 and 2.
Belgium	2.
Bermuda	A 1 and 3.
Brazil	E Art. 22, Secs. 5 and 6; E Arts. 25 and 26.
British Guiana	A 3; B (1).
British Honduras	A 2.
Borneo (British North)	3 and 4.
Canada	A 3; B 1-8; C 33, 78-79, 89-101 D.
Ceylon	A 1 (f); B 1.
China (Hong Kong)	A 4.
China (Weihaiwei)	4.
Denmark	B 2 and 3.
East Africa Protectorate	4.
Falkland Islands	1.
Fiji	A 3.
France and Algeria	A 8.
Gambia	A III. and VII.
Germany	C 22.
Gibraltar	A 2.
Gilbert and Ellice Colony	A 3.
Gold Coast Colony	A 3.

Licences, General (Permission to establish, work or modify Installations).
See also "SHIP STATIONS" (Licences).—(*Continued.*)

Great Britain	A 1 and 2; D 8; E 6; J 4 (1) and (2).
Grenada	3.
Holland	<i>See</i> Netherlands.
Hungary	1.
India	A 7 (3); B; E; F; G.
Italy	B 7 and 21; D 6-9.
Jamaica	A 1; C.
Japan	A 2.
Malaya.. .. .	A 4.
Mauritius	2.
Netherlands	A I. and II.
Newfoundland	A 1; C 6.
New Hebrides.. .. .	A 1.
New Zealand	A 164; D 2 and 14.
Nigeria (Northern)	2.
Nigeria (Southern)	A 3.
Norway	B; C.
Nyasaland Protectorate	2.
Panama (Canal Zone)	A Sec. 1.
Portugal	B 2.
Rhodesia (Southern).. .. .	A 4; B
St. Lucia	A 3.
St. Vincent	A 3.
Seychelles	A 3.
Siam	5.
Sierra Leone	A 3.
Somaliland Protectorate	A 3.
South Africa (Union of)	A Chap. V., Sec. 1, Par. 1.
Spain	C 15.
Straits Settlements	A 4.
Sudan	1.
Sweden	A 1-3.
Switzerland	B.
Trinidad and Tobago	B 2.
Uganda Protectorate.. .. .	2.
United States of America	B Subdiv. 3, Pars. 1-8; C 1; E Part 1; E Parts 2, 3, and 4.
Zanzibar	1 and 2.

LIMITATIONS ON USE OR WORKING—*see* "COMMUNICATION"
 (Restriction on); *see also* "COMMUNICATION" (Interference); *see also* "EMERGENCIES"; *see also* "FOREIGN SHIPS."

MACHINERY (Working by Wireless)—*see* "ACT" (Application).

MARITIME STATIONS—*see* "STATIONS" (Coast and Ship).

MERCANTILE MARINE—*see* "SHIP STATIONS."

MESSAGES—*see* "COMMUNICATION."

MILITARY STATIONS—see "STATIONS."

MISUSE—see "ADMINISTRATION" (Enforcement of Law, Penalties).

MODIFICATION OF APPARATUS—see "STATIONS" (General).

NAVAL SIGNALLING—see "ACT" (Interpretation); see also "COMMUNICATION" (Interference).

NAVAL STATIONS—see "STATIONS."

NEWS SERVICE—see "STATIONS" (Private and Newspaper).

OPERATORS (Conditions of Appointment, Staffing of Stations, Certification, Licences, etc.).

Argentina	..	..	..	B Chap. II., Subsec. 9, Arts. 7-9, Chap. III., Subsec. 1.
Australia	..	..	..	D 231 (5).
Austria	..	..	..	B 6; E 10; F (A)-(F).
Brazil	..	..	..	E Arts. 5-25.
Canada	..	..	..	A 6; C 5-9, 23, 26, 31, 33; D 15.
Denmark	..	..	..	B 7.
Germany	..	..	..	C 6, 7, 9-13.
Great Britain	..	..	..	D 14.
Hungary	..	..	..	8 and 10.
Italy	..	..	..	B 17 and 18.
New Zealand	..	..	..	D 17.
Norway	..	..	..	D 11.
Portugal	..	..	..	A 2; B 12-21.
Spain	..	..	..	C 15; Part 3.
United States of America	..	..	..	B Subdiv. 2; E Subdiv. 2.
Uruguay	..	..	..	B 4.

PENALTIES—see "ADMINISTRATION" (Enforcement of the Law).

PERMISSION TO ESTABLISH STATIONS—see "STATIONS" (General).

PERMISSION TO WORK STATIONS—see "LICENCES" (General); see also "COMMUNICATIONS" (Restrictions on); see also "FOREIGN SHIPS"; see also "EMERGENCIES."

PLANS AND SPECIFICATIONS—see "LICENCES" (Application).

POWER—see "SHIP STATIONS" (Requirements of Installation).

PRACTICES—see "COMMUNICATION" (Exercises).

PRIORITY OF TRANSMISSION—see "COMMUNICATION" (Distress Signals, Government Messages).

PRIVATE STATIONS—see "STATIONS."

PUBLIC SERVICE—see "COMMUNICATION" (Public Service).

PUBLICATION OF REGULATIONS—see "ACT."

RANGE—see "SHIP STATIONS" (Requirements of Installation).

RATE OF TRANSMISSION AND RECEPTION—*see* "SHIP STATIONS"
(Requirements of Installation).

RECEIVING STATIONS—*see* "STATIONS."

RECORD OR REGISTER OF MESSAGES—*see* "COMMUNICATION"
(Message Records).

REGULATIONS (International)—*see* "INTERNATIONAL CONVENTION."

REGULATIONS (Application and Interpretation of)—*see* "ACT."

REGULATIONS (Power to make)—*see* "ADMINISTRATION" (Executive
Authorities and their Powers).

RENEWAL OF LICENCES—*see* "LICENCES" (Renewal).

RENTS AND ROYALTIES—*see* "FINANCE" (Deposits, Licence Fees,
etc.).

REQUIREMENTS OF SHIP INSTALLATIONS—*see* "SHIP STATIONS"
(Requirements of Installation).

RESPONSIBILITY FOR SHIP STATION—*see* "SHIP STATIONS"
(Responsibility).

RESTRICTIONS ON WORKING—*see* "COMMUNICATION" (Restrictions
on); *see also* "COMMUNICATION" (Interference); *see also*
"EMERGENCIES"; *see also* "FOREIGN SHIPS."

RETRANSMISSION—*see* "COMMUNICATION" (Retransmission).

REVOCATION OF LICENCE—*see* "LICENCES" (Revocation).

SCOTLAND (Application of Act to)—*see* "ACT" (Great Britain).

SEARCH AND SEIZURE—*see* "ADMINISTRATION" (Enforcement of
Law).

SECRECY—*see* "COMMUNICATION" (Secrecy).

SERVICE OF DOCUMENTS, NOTICES, etc.—*see* "ADMINISTRATION"
(Enforcement of Law).

SERVICES. (For designation of kinds of Services, *see* both "COM-
MUNICATION" and "STATIONS.")

SIGNALS—*see* "COMMUNICATION" for Call Signals and Distress
Signals.

SIGNALLING PRACTICE—*see* "COMMUNICATION" (Exercises).

SPEED OF TRANSMISSION AND RECEPTION—*see* "SHIP STATIONS"
(Requirements of Installation).

STAFFING OF STATIONS—*see* "OPERATORS."

STATE CONTROL AND PREROGATIVES—*see* "ADMINISTRATION"
(Executive Authorities and other Powers); *see also* "EMER-
GENCIES."

STATIONS :**Amateur and Experimental Installations.**

Borneo (British North) ..	7.	
Brazil	E Arts. 17-18.	
Canada	C Par. 2 and C 8-32.	
Ceylon	B 2 (C).	
China (Hong Kong) ..	A 7 ; B 2 (c).	
East Africa Protectorate ..	7.	
Great Britain	A 2.	
India	G .	
Italy	B 5 and 8.	
Russia	B 10 ; C .	
Spain	B 4 and 5.	
Straits Settlements ..	A 7.	
United States of America ..	E Part 1, Subdiv. C, Pars. 3-7 ; E Part 2, 3-7.	

Coast or Shore Installations.

Argentina	B Chap. II., Subsec. 6.	
Brazil	E Art. 4.	
British Honduras	A 2.	
Canada	A 5 and 6 ; B 4.	
Denmark	B 1, 5, and 19.	
France and Algeria	1.	
Great Britain	E .	
Hungary	13.	
Italy	B 1 (c) ; B 20 (a).	
Japan	D 2 and 4.	
Siam	3 and 4.	
United States of America ..	E Part 1, Subsec. C.	

Educational or Technical Installations.

Denmark	A 4.	
Italy	B 8, 17.	
Russia	C .	
Spain	B 4 and 7.	
United States of America ..	E Part 1, Subdiv. C, Par. 4.	

Governmental.

Argentina	B Chap. II., Subsec. 6, Art. 4.	
Denmark	B 1.	
France and Algeria	A 1-7.	
Great Britain	E 5 and 17.	
Grenada	2.	
Holland	<i>See</i> Netherlands.	
Hungary	18-20.	
Italy	A 1 ; B 1 (a) ; B 5.	
Netherlands	C 1.	
New Zealand	A 162 ; D 27.	
Norway	D 15.	
Russia	B 1 and 2.	
Siam	3.	

STATIONS.—(*Continued.*)**Governmental.**—(*Continued.*)

South Africa (Union of)	..	1.
Sweden	.. ..	7.
United States of America	..	D 13, 16, 18.

Land Installations.

Argentina	.. ..	B Chap. II., Art. 1.
Australia	.. ..	B 12.
Brazil	.. ..	E Art. 1.
Canada	.. ..	A 2 ; B 4.
Ceylon	.. ..	B 2 (<i>a</i>).
China (Hong Kong)	.. ..	B 2 (<i>a</i>).
Chinese Republic	.. ..	3.
Curaçao	.. ..	See Netherlands, D 2 and 20.
France and Algeria	.. ..	A 1 (<i>a</i>).
Gambia	.. ..	A III.
Italy	.. ..	B 1 (<i>b</i>) and (<i>c</i>).
Jamaica	.. ..	B 2.
Newfoundland	.. ..	B 1.
Siam	.. ..	3 and 4.
United States of America	..	C ; E Part I, Sec. C.

Military and Naval.

Argentina	.. ..	B Chap. II., Subsec. 7.
Australia	.. ..	A 3 ; B 19.
France and Algeria	.. ..	A 1 (<i>b</i>) and (<i>c</i>).
India	.. ..	G .
Italy	.. ..	B 1.
Siam	.. ..	4.

Private Installations (Including News Stations).

Argentina	.. ..	B Chap. II., Subsec. 2.
East Indies (Dutch)	.. ..	See Netherlands, E 1 and 2.
France and Algeria	.. ..	A 1 and 8.
Great Britain	.. ..	E .
Holland	.. ..	See Netherlands.
Italy	.. ..	B 8 and 13.
Jamaica	.. ..	C 1-6.
Netherlands	.. ..	A 3.
South Africa (Union of)	..	1 (<i>a</i>) and (<i>b</i>).

Receiving.

Germany	.. ..	D (<i>a</i>)-(<i>e</i>).
United States of America	..	D Sec. 8.

Ship Installations—(1) General Regulations affecting Establishment and Working. (But for "FOREIGN SHIPS," see that head.)

Argentina	.. ..	B Chap. II., Subsecs. 7, 8, and 9.
Australia	.. ..	B 1-18 ; D 231.
Austria	.. ..	A 4 ; B 1-10 ; C ; D ; E 1-12.
Barbados	.. ..	B (3) ; C (1) and (2).

STATIONS.—(Continued.)**Ship Installations—(1).**—(Continued.)

Bermuda	B I-4.
Brazil	E Arts. 16, 39, and 51.
British Guiana	B I (1) (2).
British Honduras	B I, 5 and 8; B II., 34-67.
Canada	A 3; B 5; C 34-56.
Ceylon	A I (g); A I (i.); B 2 (b), 3, 5, 7, 8.
China (Hong Kong)	B 2 (b); B 3 and 4.
Denmark	A 2 and 3; B 2-13, 19 and 22.
Falkland Islands	2.
Fiji	A 4; B I-4.
Gambia	A III.; B I and 2.
Germany	C I-22.
Gibraltar	B 2; C I-5.
Gold Coast Colony	B 4; C .
Great Britain	A I (5); A 3; B I-4; D ; G 15-17; K .
Hungary	I-21.
India	E .
Italy	B I, 19, 20; C ; D I-15.
Jamaica	D .
Japan	A Art. 2.
Mauritius	3.
Newfoundland	D I-6.
New Zealand	C I-12; D I-29; E .
Nigeria (Southern)	B (i.)-(vi.).
Norway	D I-17.
Portugal	A I-9; B I-34.
Russia	C .
St. Helena	A I and 2; B I-4.
St. Lucia	A 4; B I-6.
Siam	5, 6 and 8.
Sierra Leone	A 4; B I-6.
Somaliland Protectorate	A 4; B (i.)-(vi.).
Spain	B 7; C 12, 15, 26, 28-32; D 7-11.
Straits Settlements	B I-4.
Sweden	C .
Trinidad and Tobago	A 2; C I-5.
United States of America	B 4-9; E Subdiv. B.
Uruguay	B I-9.

Ship Installations—(2) Auxiliary Apparatus and Power.

Argentina	B Chap. II., Subsec. 8, Art. 9.
Australia	231 (2) c.
Germany	C 3.
Great Britain	D (I.) d.
Hungary	4.
Italy	D 5-12.
Portugal	B II.
Sweden	D 59.
United States of America	B Subdiv. 3, Art. 5. (p. 506).

STATIONS.—(*Continued.*)

Ship Installations—(3) Classification of.

Argentina	B Chap. II., Subsec. 8, Art. 9.
Canada	C Sec. 34-39.
Germany	C 8.
New Zealand	D 4.
Norway	D 1.
Portugal	B 3.
Spain	D 8.
Sweden	D 57.
United States of America ..	E Subdiv. 3, 1-10 (p. 519).

Ship Installations—(4) Compulsory Installation.

Argentina	B Chap. II., Subsec. 8, Art. 1.
Australia	D 231 (1) (3).
Austria	C .
Brazil	A 159.
Canada	A 4.
Great Britain	G 15; J 4 (1)-(4); K .
Greece	A , Arts. 1-3.
Hungary	Preamble.
Italy	C ; D 1-15.
Newfoundland	C 1 and 3.
New Zealand	E 1-4.
Portugal	A 1.
Spain	A 1.
Sweden	C ; D 56 and 57.
United States of America ..	A Par. 3.
Uruguay	B 1 and 7.

Ship Installations—(5) Documents to be Carried.

Canada	C 71; D 16.
Denmark	B 2.
Great Britain	D 13 and 17.
Spain	C 13.
New Zealand	C 21.
United States of America ..	E Part III. (a) (b) (p. 525).

Ship Installations—(6) Finance.

Argentina	B Chap. II., Subsec. 10.
Australia	B 5.
Austria	B 2, 8, 10; E 4-9 and 12.
Barbados	B (2).

STATIONS.—(*Continued.*)**Ship Installations.**—(6) Finance.—(*Continued.*)

Brazil	B ; E Chaps. V. and VI.
Canada	A 13 (2) ; C 105 ; D 17 (3).
Ceylon	A 1 (a) (d) (f) ; B 2 (b).
China (Hong Kong) ..	B 2 (b).
Denmark	11, 12, 18, 19, 20.
Great Britain	D (III.) 10 (2), 15, 18, 20 (3).
Hungary	11-15 and 19-20.
Italy	B 20.
Japan	Arts. 11-14.
New Zealand	D 18 (2).
Norway	D 10, 12-15.
Portugal	A 8.

Ship Installations.—(7) Licences.

Argentina	B Chap. II., Subsec. 9, Arts. 5 and 8.
Australia	B 3-10.
Austria	B 1-10.
Belgium	174.
Bermuda	A 1-3.
Borneo (British North) ..	3 and 4.
British Guiana	A 3 ; B 1 (1).
Canada	A 3 ; C 23, 78, 79, and 97.
Ceylon	A 1 (c) ; B 1 and 2 (b).
China (Hong Kong)	A 3 and 4 ; B 1 and 2 (b).
China (Weihaiwei)	1.
Denmark	B 2 and 3.
East Africa Protectorate ..	4.
Falkland Islands	1 and 2 ; C 22.
Gibraltar	A 2.
Gold Coast Colony	B 3 (2).
Great Britain	A 1 (2) ; D 19 and 21.
Hungary	1, 8, 17, 18.
Italy	B 7-16, 21 ; D 6 and 8-9.
Mauritius	2.
Newfoundland	A 1.
New Zealand	D 2, 22, 23, 26, 29.
Norway	D 2, 3, 16.
Portugal	B 2.
St. Lucia	A 3.
St. Vincent	A 3.
Siam	5.

STATIONS.—(*Continued.*)

Ship Installations—(7) Licences.—(*Continued.*)

Sierra Leone	A 3.
Spain	C 15.
Straits Settlements .. .	A 4.
United States of America ..	B Sec. 2 (p. 500).

Ship Installations—(8) Operators.

Argentina	B Chap. II., Subsec. 9, Arts. 9-10.
Austria	B 6; F 1-22.
Brazil	E Art. 14, 3.
Canada	A 6; C 75-83, 87.
Denmark	B 3 (<i>d</i>) 7.
Germany	C 6, 7, 9-13.
Great Britain	D 12; G 16 and 17.
Hungary	8 and 10.
Italy	B 17 and 18.
New Zealand	D 17.
Norway	D 11.
Portugal	A 2; B 12-21, 33.
Spain	C 15.
United States of America ..	B Sec. 2, Art. 4 (p. 502).
Uruguay	B 4.

Ship Installations—(9) Requirements of Installation.

Argentina	B Chap. II., Subsec. 8, Arts. 8-10, and Subsec. 9, Art. 5.
Australia	B 7; C ; D 231 (2).
Austria	A 4.
Canada	A 4; C 17-51, 57.
Denmark	B 3, 4, and 6.
Germany	C 2.
Great Britain	D (i.) <i>a-f</i> ; D 8.
Greece	A Art. 5.
Hungary	2, 5, 6.
Italy	C ; D .
Newfoundland	C 1 and 2.
New Zealand	D 4-7, 14.
Norway	D 2-5.
Portugal	B 1, 4-10 and 34.
Spain	B 6 (2).
United States of America ..	B Part 3 (p. 506).
Uruguay	B 2-4 and 6.

STATIONS.—(*Continued.*)**Ship Installations—(10) Responsibilities of Captains, Shipowners, etc.**

Argentina	..	..	..	B Chap. II., Subsec. 8, Art. 7.
Australia	..	..	..	D 231 (3)
Austria	..	..	..	B 5; E 5-7 and 10-12.
Barbados	..	..	..	5 (3); C (1) and (2).
Belgium	..	..	..	6 and 7.
British Honduras	..	..	..	B VI.
Canada	..	..	..	A 4; C 70.
Ceylon	..	..	..	B 7.
Denmark	..	..	..	B 12.
Gold Coast Colony	..	..	..	C (iv.).
Great Britain	..	..	..	G 15 (3).
Hungary	..	..	..	7, 9, 10, 12, and 14.
Italy	..	..	..	D 8 and 9.
Jamaica	..	..	..	C 5.
New Zealand	..	..	..	E 8.
Nigeria (Southern)	..	..	..	B (iv.).
Portugal	..	..	..	A 3-6; B 18, 22, 23, and 32-34.
St. Lucia	..	..	..	B 4.
St. Vincent	..	..	..	B 4.
Siam	..	..	..	8.
Somaliland	..	..	..	B (iv.).
Spain	..	..	..	D 7.
United States of America	..	..	..	B Appendix B and C, Sec. 3.

Ship Installations—(11) Restrictions on Working. *See also "EMERGENCIES"; see also "COMMUNICATION" (Restrictions on); see also "COMMUNICATION" (Interference).*

Barbados	..	..	..	C 1.
Bermuda	..	..	..	B 1.
Brazil	..	..	..	E Art. 53.
Canada	..	..	..	C 9-12, 19-22, 27, 73; C 4-7.
Ceylon	..	..	..	A 1 (g), (h), (i); B 5.
China (Hong Kong)	..	..	..	B 4.
Denmark	..	..	..	B 21, 22.
Falkland Islands	..	..	..	2.
Gibraltar	..	..	..	B 2; C 2.
Gold Coast Colony	..	..	..	B 4; C (III.).
Great Britain	..	..	..	D (II.), D 2.
Italy	..	..	..	B 19.
New Zealand	..	..	..	D 8 and 9.
Nigeria (Southern)	..	..	..	A 4; B (III.).

STATIONS—(*Continued.*)

Ship Installations—(I I).—(*Continued.*)

Norway	..	..	..	D 8.
St. Helena	..	..	..	B 2.
St. Lucia	..	..	..	A 4; B 3; C 1-3.
St. Vincent	..	..	..	A 4; B 3.
Siam	..	..	..	6.
Sierra Leone	..	..	..	A 2; B 2.
Somaliland Protectorate	..	..	..	A 4; B (III.).
Straits Settlements	..	..	..	B 2.
Sweden	..	..	..	C.
Trinidad and Tobago	..	..	..	A 2; B 1-3; C 2.
United States of America	..	..	..	D 1-10, 15-18; also Sec. 8.

Shore Installations—see "STATIONS" (Coast).

Stations (General), Conditions for the Establishment of.

Argentina	..	..	..	A 4-6; B Chap. II., Subsec. 2, Arts. 1-3 and 8.
Australia	..	..	..	A 4, 5; C.
Austria	..	..	..	A 1, 2; E 12.
Bahamas	..	..	..	2.
Barbados	..	..	..	2.
Belgium	..	..	..	1, 3, 4.
Bermuda	..	..	..	A 1.
Borneo (British North)	..	..	..	4.
British Guiana	..	..	..	A 3; B 1 (1).
British Honduras	..	..	..	A 1.
Canada	..	..	..	A 3, 13; B 3, Par. 3; C 37-51.
Ceylon	..	..	..	A; B 1.
China (Hong Kong)	..	..	..	A 3 and 4; B 1.
China (Weihaiwei)	..	..	..	1.
Chinese Republic	..	..	..	2, 3, 15.
Denmark	..	..	..	B 1, 2, 3.
East Africa Protectorate	..	..	..	3, 4.
Egypt	..	..	..	1.
Falkland Islands	..	..	..	1.
Fiji	..	..	..	A 3.
France and Algeria	..	..	..	A 1-8.
Gambia	..	..	..	A i., ii., iii.; C 2, 3, 4.
Germany	..	..	..	A 1 and 2.
Gibraltar	..	..	..	A 2.

STATIONS—(*Continued.*)**Stations (General).**—(*Continued.*)

Gold Coast Colony	A 2 ; B 3.
Great Britain	A 1.
Grenada	3.
Holland	See Netherlands.
Hungary	1.
India	B 4 and 6 ; D 8-12.
Italy	A 1 ; B 1, 7.
Jamaica	A 2 ; B 1, 2 ; D 1-2.
Mauritius	2, 4.
Netherlands	A 1 ; B 1-3.
Newfoundland	A 1, Clause 2, Subsec. 2.
New Zealand	A 163-164 ; E 1-8.
Nigeria (Northern)	1-4.
Nigeria (Southern)	A 3.
Norway	A 1, 2 ; B.
Nyasaland Protectorate	2.
Panama (Canal Zone)	A.
Rhodesia (Southern)	A 4 ; B.
Russia	C.
St. Lucia	A 3.
St. Vincent	A 3.
Seychelles Islands	A 1-3 ; B 1-2.
Siam	3.
Sierra Leone	B 1.
Somaliland Protectorate	A 3.
South Africa (Union of)	1.
Spain	B 2-7 ; C 3, 10 ; D 1, 7.
Straits Settlements	A 3, 4.
Sweden	A 1-3.
Uganda Protectorate	2.
United States of America	C.

SYNTONISATION—see “SHIP STATIONS” (Requirements of Installation).

SYSTEMS (Intercommunication with Other)—see “SHIP STATIONS” (Requirements of Installation).

TECHNICAL or TRAINING INSTALLATIONS—see “STATIONS” (Educational).

USE—see “COMMUNICATION.”

WAR RESTRICTIONS—*see* “EMERGENCIES.”

WATCH—*see* “OPERATORS”; *see also* “SHIP STATIONS” (Requirements of Installation).

WAVES AND WAVE-LENGTH—*see* “SHIP STATIONS” (Requirements of Installation).

WORKING OF STATIONS—*see* “COMMUNICATION.”

THE VARIOUS ACTS, DECREES, REGULATIONS, ETC., REFERRED TO IN THE FOLLOWING LAWS ARE ENUMERATED AT THE BEGINNING OF EACH COUNTRY'S LAWS AND NUMBERED BY CAPITAL LETTERS OF THE ALPHABET. IT IS THESE LETTERS WHICH ARE REFERRED TO IN THE INDEX PREFIXED HERETO.

ABYSSINIA

THIS historically famous country, more commonly known to the ancients as Ethiopia, is an empire, at present under the rule of Ulzero-Zeddita. The people profess a primitive form of Christianity, but are illiterate, and the admission of Abyssinia to the Postal Union is probably due to the fact that the posts and telegraphs are under French administration.

There are no wireless stations working in the "Empire" under independent native rule, but a radiotelegraphic station is maintained at Gambela, in the enclave of Kassala. This was constructed and is worked by the Sudan Government. *For Regulations, see under "Egypt, Sudan."*

ANTIGUA (LEEWARD ISLANDS)

(See WEST INDIES (BRITISH), page 543.)

ANTILLES (GREATER)

(See WEST INDIES (BRITISH), page 535.)

ANTILLES (LESSER)

(See WEST INDIES (BRITISH), page 539.)

ARGENTINE REPUBLIC

SITUATED, so far as latitude is concerned, between $20^{\circ} 50'$ and $55^{\circ} 19'$ south, and possessing a longitude stretching from $53^{\circ} 41'$ to $70^{\circ} 56'$ west of Greenwich, Argentina is the second in size of the Republics of South America. The country was first visited by Spanish explorers in 1516, and remained a Colony of Spain until the Argentinos founded a Provisional Local Government in 1810. Their war for independence did not cease until 1825, when Great Britain definitely recognised Argentine independence.

The fundamental law establishing the constitution of the Republic was sanctioned on September 25th, 1860, with modifications introduced in 1866 and 1898. The Executive Power is vested in a President; whilst the Legislative Authority is exercised by a National Congress, comprising a Senate and House of Deputies.

The total area of the fourteen provinces and ten territories, which go to make up Argentina, comprise in all about 1,132,000 square miles. The capital city is Buenos Aires, situated on the Rio de la Plata. The census of 1914 gave the total population as comprising 7,905,502 persons.

The Radiotelegraphic Law, passed in October 1914, definitely assigned the direction of wireless telegraphy and the public wireless service to the Minister of Marine. The only exceptions are matters of disbursements and receipts, as well as of Schedule of Charges. These are supervised by the Director-General of Posts and Telegraphs.

The first radiotelegraphic stations to be installed in the Argentine Republic were two equipments worked under the Argentine Ricaldeni System. These installations were set up in 1902, by permission of the Argentine Admiralty, on the North Dock and on the s.s. *Vigilante*, their maximum range being 50 miles.

In the same year the Minister of Marine acquired two Rochefort System stations, one of which was installed ashore on the Admiralty buildings, and one on the coastguard vessel *Libertad*. Three further shore Government stations were erected in 1904: (a) On the Government Buildings; (b) on the River Plate Arsenal; (c) on the Recalada Lighthouse. In the same year the Telefunken (German) Company erected an experimental station on the North Dock, which was shortly afterwards shut down.

Further experimental installations on the cruisers *9 de Julio* and *Patria* followed. These gave good results, and were extended. The trial of various systems continued throughout 1906 and 1907. A new installation took the place of the older one on the Admiralty buildings in 1907, and this is the one still working. The year 1909 was marked by notable extensions in Argentine wireless, especially exemplified in the establishment of a factory for making wireless equipment for the Navy. All through 1909, 1910, and 1911, the installation of apparatus on Argentine naval vessels proceeded, activities being specially marked in the last-named year. This action has continued since with the net result that Argentina possesses a number of coastal stations (see our Land Stations Section) of the Telefunken variety, modified to suit Argentine requirements; whilst a specially designed naval pattern is used in the Navy (see our Ship Stations Section), except in the case of two vessels equipped with apparatus supplied by the American Marconi Company.

THE ORGANISATION OF THE PUBLIC RADIO- TELEGRAPHIC SERVICE.

The Radio Law, passed in October 1914, definitely assigned the direction of Radiotelegraphy and the Public Wireless Service in Argentina to the Minister of Marine. The following are the principal officials exercising administrative functions:—

1. The Head of the Naval Radio Service, Ismael F. Galindez, General Secretary to the Minister of Marine.

2. The Head of the Radiotelegraphic Office, Powhatan Page, Cruiser-Captain in the Navy.

The above-mentioned RADIOTELEGRAPHIC OFFICE controls the whole of the Naval and Public Services, with the sole exception of

the Schedule of Tariffs and of Disbursements and Receipts, matters which are assigned to the Director-General of Posts and Telegraphs.

The Radiotelegraphic Office, which was instituted in 1915, and reorganised in 1917, comprises five Departments :—

- (a) The Transmission Department, which deals with messages and custody of documents.
- (b) The Technical and Inspection Department.
- (c) The Testing Department, which deals with apparatus and material.
- (d) The Works Department, which deals with installations and repairs.
- (e) The Accounts Department.

Each department is administered by a Radiotelegraphic Engineer, with the exception of Section E, which is under an accountant. All these officials are attached to the National Navy.

RADIOTELEGRAPHIC STATIONS.

The List of COASTAL AND SHIP STATIONS will be found published in full in the Official Schedule, and appear also in the Section of this volume devoted to "Land and Ship Stations," under the heading of "Argentina (Republic)."

Of EXPERIMENTAL AND AMATEUR STATIONS there are but 25 throughout the territories of the Argentine Republic. The explanation of this small number may be found in the fact that the Minister of Marine does not readily grant licences for such establishments.

Private Stations Open for Public Service.—No such stations are in operation.

High-Power Stations.—Two concessions for such installations are in existence, one granted to the Marconi Company in 1906, and the other to the "Federal Holdings" Company in 1915.

PERSONNEL.

The personnel employed in the Radiotelegraphic Office consists of the following :—

Higher Officials.—One Naval Captain, one Cruiser Captain, four Radiotelegraphic Engineers, and one Official Accountant.

Subordinate Officials.—Four Second-Grade Officials, thirty Radiotelegraphic Mechanics, seventy Rank-and-File, and fifty Radiotelegraphic Recruits.

The Subordinate Staff is divided into three sections :—

- (a) Mechanics ; (b) Marine Telegraphists ; (c) Recruits.

RADIOTELEGRAPHIC LAW.

On July 5th, 1913, the National Congress passed the first Radiotelegraphic Law (printed in former editions of our YEARBOOK). This has been since replaced by Law No. 9127 of September 16th, 1913, which appeared in our 1917 issue with the Regulations attached

thereto. The latter have been revised since the publication of our last volume, and the revised text will be found in our pages.

The following is the list of current regulations which appear below :—

A—Law 9,127 of September 16th, 1913.

B—Executive Decree of July 12th, 1917.

C—Temporary Measures.

LAW.

A LAW NO. 9,127 PASSED BY THE NATIONAL CONGRESS ON SEPTEMBER 16TH, 1913.

ART. 1.—The wireless service within the national territory, and for international communications within a minimum distance of 1,000 kilometres, shall be exclusively under the control of the State.

ART. 2.—The executive shall attend to the erection of wireless stations within the national territory, and shall so select the sites for the coast ones that all ships sailing near our coasts and navigating our rivers may always be in touch with them.

ART. 3.—The sum of \$400,000 national currency are hereby allocated to the above. This amount will be charged to General Expenses.

ART. 4.—The use of wireless apparatus in perfect working order is hereby declared compulsory for all ships calling at the ports of Argentine carrying fifty or more persons on board, counting the passengers and the crew, on and after ninety days have elapsed since the promulgation of this law.

ART. 5.—Wireless apparatus handled by skilled operators must have at all times a transmission power of not less than 200 kilometres for river craft, and not less than five hundred kilometres for sea-going vessels.

ART. 6.—No ships will be allowed to leave port until the prescriptions of Arts. 4 and 5 have been complied with, and should the captain or the officer in charge try to elude or contravene this regulation, the superior local marine authority shall impose a fine of from one thousand to five thousand pesos. The party so fined can appeal to the federal magistrate of the district where the contravention has been committed. A double fine will be the penalty for a repetition of the offence.

ART. 7.—The Executive will promulgate the regulations in accordance with this law.

ART. 8.—The above Act of Parliament shall be communicated to the Executive.

The above was approved by the Argentine Congress in the city of Buenos Aires on the sixteenth day of September in the year of our Lord nineteen hundred and thirteen.

EXECUTIVE DECREE OF JULY 12TH, 1917.

This is divided into two parts. Of these Part I. only is printed in extenso. Part II. will be found summarised at the end of Part I.

CHAPTER I.

SUB-SECTION I.

B ART. 1.—The “General Rules and Regulations for the Radiotelegraphic Service in the Argentine Republic,” as issued by the Secretary-General of the Marine Ministry, are hereby approved.

ART. 2.—The following Regulations and Ordinances are hereby repealed :—

Regulations for the Radiotelegraphic Stations of the Navy (December 1st, 1916).

Regulations and Plan of Studies for the Radiotelegraphic Staff (November 27th, 1912).

Regulations for the Radiotelegraphic Service (July 5th, 1913).

Regulations for the Radiotelegraphic Service in the Argentine Republic (October 24th, 1914); and every other regulation affecting the Radiotelegraphic Service issued either as General Instructions, Orders of the Day or Circular Letters from the Marine Ministry, as from the year 1906 inclusive to this date.

ART. 3.—The necessary copies (of the new Rules, as mentioned in Art. 1) to be printed.

ART. 4.—This decree to be communicated, published, etc.
(Signed) Irigoyen,

F. ALVAREZ DE TOLEDO.

The following are the documents approved by the Executive Decree above quoted :—

SUB-SECTION 2.

ORGANISATION OF THE RADIOTELEGRAPHIC DEPARTMENT.

ART. 1.—The Radiotelegraphic Service constitutes a Department of the General Secretaryship of the Ministry of Marine.

ART. 2.—The following duties correspond to this Department :—

(a) To intervene in everything affecting the military and public radiotelegraphic service depending from the Ministry of Marine and under its inspection and control.

(b) To intervene in the formation of reports and in the claims and suits that may be promoted.

(c) To study and comply with the international laws, regulations, instructions and conventions or pacts that may affect this service.

(d) To work in the reforms tending to improve the service both in connection with technical details and those of a purely disciplinary character.

(e) To intervene in the preparation of instruction plans and the examination of subordinate radiotelegraphists and civil



DISTANT VIEW OF MASTS OF CEYLON WIRELESS STATION.

operators, to propose their promotion and to issue the corresponding credentials (*patentes*).

(f) To intervene in the purchase of radiotelegraphic materials, giving advice and reporting on results.

(g) To attend to that part of the correspondence and intercourse with the Berne International Office referring to this service.

ART. 3.—The Radiotelegraphic Service Department will be divided into the following sections :—

(a) Inquiries, Correspondence, and Archives.

(b) Technical Inspection and Superintendency.

(c) Shop, Installations, and Repairs.

(d) Test of apparatus and materials.

(e) Accounting.

ART. 4.—The staffs in the land stations and in the floating light-houses will be as permanent as consistent with the good service. The staffs will in matters affecting discipline, re-examination and licences, be subordinate to the Secretary of the Ministry ; but the last-named officer will see that the General Direction of Personnel is kept informed of the changes occurring in this service.

With the General Secretary rests the duty of putting before the General Director of Personnel any changes that may be considered necessary in the radiotelegraphic staffs on board units of the Navy.

CHAPTER II.

REGULATIONS GOVERNING THE RADIOTELEGRAPHIC SERVICE.

SUB-SECTION I.

JURISDICTION OF THE SEVERAL MINISTRIES ACCORDING TO LAW NO. 9127.

ART. I.—The national territory is hereby divided into two zones for the purposes of jurisdiction and regularisation affecting the service of radiotelegraphic installations. The aforesaid zones are as follows :—

1. The *Maritime Zone*, which includes all ship stations in the maritime territorial waters and navigable rivers, besides all land stations situated within one hundred kilometres from the sea and River Plate coasts and those situated within fifty kilometres from the banks of any other navigable rivers.

2. The *Terrestrial Zone*, which includes all other installations on national territory which are not covered by the above.

ART. 2.—(a) The Maritime Zone is under the jurisdiction of the Minister of Marine, who is responsible for the control of the Public Radiotelegraphic Service and who prescribes the rules and regulations for wireless service in this particular zone.

(b) The Minister of Marine shall also undertake the duty of transmitting all information of any nature which may be asked from them by the International Bureau of Berne.

ART. 3.—(a) The Terrestrial Zone is under the jurisdiction of the Minister of the Interior, who controls the Public Radiotelegraphic Service and who prescribes the rules and regulations for wireless in this particular zone.

(b) In special cases when a state of siege is declared, all installations in this zone shall be placed under the control of the War Office.

ART. 4.—Other Executive Offices can order the installation of wireless stations for their exclusive use, but in such cases the working of such installations must be authorised by the Minister exercising control in the respective zones, and the rules and regulations prescribed for the latter must be observed in these particular stations.

ART. 5.—All wireless installations erected in the national territory must observe the international rules and regulations adhered to by the Government of the Republic, and the General Law regulating the Telegraph Service must be observed in all matters appertaining to the Public Radiotelegraphic Service.

SUB-SECTION 2.

PERMITS FOR THE INSTALLATION OF PRIVATELY OWNED RADIOTELEGRAPHIC STATIONS.

ART. 1.—Law 9127, having been passed with the object of nationalising of the wireless service, the installation of high-powered wireless stations by private individuals or corporations shall only be allowed in the national territory when such installations are destined for inter-continental communication.

ART. 2.—The granting of such concessions as authorised by Art. 1, corresponds to the Minister in whose jurisdiction the new station is to be erected.

ART. 3.—Where the Ministry having control over the zone where the wireless installation is to be erected has given his consent, all the rulings of said Ministry, or any other of its decisions regarding the stations directly dependent on the said installation, must be obeyed unquestionably.

ART. 4.—In general it shall be the duty of the Minister of the Interior to negotiate the bases of agreements in course of conclusion with neighbouring countries, and he will communicate with the Minister of Marine the results arrived at in the course of such negotiations, so that the latter may give effect to any such conventions in so far as they affect his department. The Minister of Marine shall have the right of being consulted in the negotiation of the bases for such conventions.

ART. 5.—No radiotelegraphic (transmitting or receiving) station will be erected without obtaining first the necessary licence from the Minister in whose jurisdictional zone the station is to be established.

ART. 6.—To obtain the licence referred to in Art. 5, the installation must fulfil the following requirements:—

(1) The primary transmitting power must not exceed 50 watts.

(2) The wave-length must not exceed 300 metres in the transmitter.

(3) The receiver may be suitable to receive waves of any length, providing that the Executive Government have no objection thereto.

(4) The installation must not be used for any interchange of messages in the public service. It will be devoted to experimenting, and only when in the judgment of the Government no harm or disturbance would arise from its use to the nearest national stations can the installation send or receive special messages.

ART. 7.—Anyone infringing the rules set out in Arts. 5 and 6 will be penalised in accordance with the penalties established in the General Law relating to the National Telegraph Service.

ART. 8.—Private installations authorised in accordance with Art. 6 must be inspected by the official inspectors, who are entitled to all the information and data they may demand. These installations must be registered and the wireless apparatus must be stamped by an inspector. The Minister exercising jurisdiction in the respective zone can order at any time the closing of authorised private wireless installations.

SUB-SECTION 3.

REGULATIONS AFFECTING ALL INSTALLATIONS ON NATIONAL TERRITORY AND ON BOARD SHIPS.

ART. 1.—The power to be used in all installations on land will be limited to that necessary for communication with the nearest stations in the system. Coast installations which must have high power in order to communicate at long distances are excluded from this limitation.

ART. 2.—(a) All installations open to public service must receive all messages sent by stations under the control of any Ministry or by any of the National Telegraph offices, provided that the regulations established by each administration regarding the radiograms which may go over their lines, are complied with at the original stations from which the messages are radiated.

(b) Foreign vessels under the flag of a country which has not adhered to the London Convention will be allowed to communicate with Argentine coast and stationary ship stations, provided the agents representing the Company owning such foreign ships ask for the extension of this privilege and fulfil all the requirements established by the present Regulations and by the London Radiotelegraphic Convention.

ART. 3.—Radiograms will be transmitted in the order of priority established by the Law on National Telegraphs and the Radiotelegraphic Convention, namely :—

(a) Distress calls have absolute priority upon any other communication ; then follow :—

(b) Service notices of whatever origin when referring to “ the Safety of Life at sea ” or containing information of an urgent character for navigation.

(c) Messages from the Executive Government.

(d) Service notices from the Radiotelegraphic stations.

(e) Messages from the Ministry of Marine, its dependencies and its fleets.

(f) Service notices from the shipping companies.

(g) Private messages.

ART. 4.—In accordance with Art. 101 of the Law on National Telegraphs, messages belonging to the same category will be transmitted by the station of origin in the order in which they are delivered to this station, and by the relay stations, in the order in which they are received.

ART. 5.—In accordance with Art. 102 of the Law on National Telegraphs, private messages stamped as urgent in the "telegraph" system, should have priority in transmission, even upon messages of a superior category not stamped as urgent.

ART. 6.—Any radiogram referring to the internal service of a fleet, squadron or division in march, will be considered as urgent and transmitted accordingly.

ART. 7.—Every official unprepaid radiogram or telegram sent by Marine officers with authority to do it, will be signed with the corresponding telegraphic address, and such messages will be legalised outside their text with the seal and signature of the competent officer on land or on board.

ART. 8.—The following is a list of Marine Officers who are authorised to send unprepaid radiograms and telegrams, according to the Navy Disciplinary Regulations :—

Secretary-General of the Ministry.

Chief of the Radiotelegraphic Department.

Chief of the Hydrography, Lighthouses and Buoys Department.

Inspector of the Marine Ministry's Dependencies in Tierra del Fuego and Cabo Virgenes.

Director-General of Personnel.

Director-General of Material.

Director-General of Administration.

Prefect-General of Ports.

Prefects of Maritime and River Zones.

Director of the Naval School.

Director of the Training School.

Director of the Mechanics School.

Chiefs of Fleets, Divisions, Squadrons, Light Squadrons or Groups.

Chiefs of Staff of Squadrons and Divisions.

Chiefs of shipyards and Maritime Zones.

Chief of the Aviation Grounds in "Fuente Barragán."

Commanders of Ships.

Commander of the Marine Depot (*Depósito de Marinería*).

Command of Coast Artillery and "Martín García."

Managers of Coast Radiotelegraphic Stations.

Managers of Lighthouses and Director of the "Año Nuevo" Observatory, when addressing the Chief of Hydrography, Lighthouses and Buoys, or the sectional chiefs in his jurisdiction.

Sub-Prefects and their Assistants when addressing the Prefect-General or the jurisdictional Prefect.

The lists of officers belonging to other branches of national service and who have authority to forward unprepaid messages will be communicated to the Radiotelegraphic Offices when necessary.

ART. 9.—The Manager of a station may demand from any sender of a radiogram proof of his identity before transmitting the message, acting in accordance with Arts. 82 and 83 of the Law on National Telegraphs of 1875.

ART. 10.—In order to improve the service and with a view to regulate the exchange of radiograms between units of the Navy, coast stations and foreign ships—strictly following the regulations established by the London International Radiotelegraphic Convention of 1912—the Radiotelegraphic Stations belonging to the Navy—whether opened or not to the public—will act in the way hereinafter detailed to make their calls, answers, transmissions, requests of rectification, repeats and notices of reception, viz :—

1. Calls.

Every call is made up by the sign — . — . — followed by the letters of the station to be called, repeated three times, and by the word “ de ” (— . . .), followed by the call letters of the calling station repeated three times.

Example of a Call.—Station LIA calls station LIC thus : — . — . — LIC LIC LIC — . . . LIA LIA LIA.

2. Answers.

The station that is being called answers thus : The sign — . — . — followed by the call letters of the calling station, repeated three times ; then the word “ de ” followed once by the call letters of the called or answering station, and ending with the sign — . — (invitation to transmit).

Example of an Answer.—Station LIC answers its call to station LIA inviting the latter to transmit its communication, thus : — . — . — LIA LIA LIA — . . . LIC — . —

3. How to Transmit a Radiogram.

The following are the elements in which is divided every radiogram :—

1. Sign of attention — . — . —
2. Preamble.
3. Supplementary Service instructions, if any.
4. Address.
5. Text of the radiogram.
6. Signature.
7. Signal of end of message . — . — .

8. Call letters of the transmitting station. If there are several radiograms to transmit these letters will be sent only after the last message.

The *Preamble* of a radiogram is composed as follows :

- I. The word “ Radio.”
- II. Class of the radiogram.
- III. Category of the radiogram. (Class and category are expressed by a group of letters called *prefix*.)

- IV. Name of the office of origin.
- V. Number of the radiogram.
- VI. Number of words.
- VII. Date and hour in which the radiogram was received for transmission.
- VIII. Service instructions.
- IX. Sign — . . . — (Double hyphen).

Supplementary service instructions are those which are transmitted upon request from the sender, and are charged for.

The following order will be observed in the transmission of every radiogram :—

			1. Sign of attention — . — . —
			2. The word "Radio."
			3. Class of the radiogram.
			4. Category of the radiogram.
			5. Name of office of origin.
Preamble	..	..	6. Number of the radiogram.
			7. Number of words.
			8. Date and hour in which the radiogram was received for transmission.
			9. Service instructions.
			10. The sign — . . . —
Supplementary service instructions			11. Supplementary service instructions (if any).
			12. The sign — . . . —
Address	..	..	13. The address (which will have at least 2 words).
			14. The sign — . . . —
Text	..	..	15. The text of the radiogram.
			16. The sign — . . . —
Signature	..	..	17. Signature.
			18. Signal of end of message . — . — .
			19. Call letters of the transmitting station.

Examples.—1. At 8.15 a.m. of the 15th of a month was delivered at the *TORO* station a radiogram for transmission, as follows : López Sarmiento 667 Buenosaires. Send by fast freight 10 cases Viscosine oil. Suárez.

The above radiogram will be transmitted in the following order :
 — . — . — Radio (prefix of class and category) *TORO*. 175 13 15 8.15 m. — . . . — López Sarmiento 667. Buenosaires — . . . — Send by fast freight 10 cases Viscosine oil — . . . — Suárez . — . — . LMP.

2. The Radiotelegraphic installation of "Dársena Norte" receives the following message on the 25th at 8.15 p.m. from *Morón* for *Benítez*, steamship *Rawson*: "On arrival you will find letter and documents asked for. *Rodríguez*." This radiogram will be transmitted thus :
 — . — . — Radio (prefix) *Morón* 16 14 25 8.15 s. — . . . — Benítez Steamship *Rawson* — . . . — On arrival you will find letter and documents asked for — . . . — *Rodríguez* . — . — . LIA.

3. Example of a radiogram from the ship *Cabo Corrientes*, on the 15th at 3 p.m., to be transmitted to Berlin, via *Monrovia*, and reading :
 Schroeder Uhlandstrasse 35 Berlin. Send motor type DRS 10 HP

Wagner. This message will be transmitted thus: — . — . — Radio (prefix) Cabo Corrientes 25 11 15 3 s via Monrovia — . . . — Schroeder Uhlandstrasse 35 Berlin — . . . — Send motor type DRS 10 HP. — . . . — Wagner . — . — LMO.

4. Notice of Reception.

When the receiving station receives a radiogram and has verified the number of words stated in the preamble, notice of reception must be given in this form:

"Call letters of the transmitting station followed by the word *de* (from) followed by its own call letters. Then the letter *R*, the number of the radiogram and the sign to indicate end of transmission . — . — . or end of work . . . — . — , as the case may be.

Example: — . — . — LIA *de* LMX *R* 76 . — . — .

5. How to Ask for a "Repeat."

The method to ask for a repeat will be the following:—

"The characteristics of the transmitting station will be sent followed by the word *de* (from), and then by the characteristics of the receiving station, and the combination QTA followed by the number of the radio."

Example: — . — . — LIA *de* LMX QTA 77 — . —

If only a part of the radiogram is to be repeated, the message will be: — . — . — LIA *de* LMX QTA 78 *desde* (from) — . —

Should the receiving station have any doubt as to the radiogram received or the number of its words, a rectification may be requested thus:

"Sign of attention — . — . —; call letters of the transmitting station, once; the word *de* (from); call letters of the receiving station; the combination QTC; the number of the radiogram to be rectified and the signal — . —

Example: LMX asks from LIA the rectification of radiogram 71: — . — . — LIA — . . . LMX QTC 71 — . —

Station LIA answers: — . — . — LMX — . . . LIA QTC 71 *r z p 2 v w k r* . — . — .

Here the letters and figures *r, z, p, 2, v, w, k, r* are the initial letters of each word, and the first figure of each number.

6. How to Express the Number of Words.

When the actual number of words signalled is not the same as the number of words charged for, the fact should be expressed as a common fraction in which the numerator will indicate the number of words charged for and the denominator the actual number of words transmitted.

Take as an example the following radiogram: Alvarez Calle Corrientes 725 Buenosaires. Ship immediately: 100 liters benzine, 5 kilograms oakum, 5 kilograms Viscosine oil Suárez 22/18 (22 — . . . — . 18).

The real number of words in the message is 18, but the three punctuation marks and the *underline* are counted and charged as words.

7. *How to Give the Date and Hour.*

The date and the hour will be indicated by two groups of figures : the first group will represent the date of the month, and the second the hour and minutes followed by the letter *m* or the letter *s*, as the case may be, meaning *before noon* and *after noon*, respectively.

For instance, in a message received for transmission the 15th of the current month at 4.36 p.m., this information will be given thus : 15 4.36 s.

8. *How to Use the Sign — . . . —*

Hereafter the sign — . . . — will be used to represent the double dash (=), and not as heretofore to represent the letter *elle* (*ll*). This letter *ll* will be represented from now on by two consecutive *eles* (*l*) (. — . . . — .).

9. *How to Request a Station to Wait.*

When a coast station is not ready to receive a number of radiograms after the preliminary communications from a ship, as detailed in Art. XVIII of the Rules annexed to the London Radiotelegraphic Convention of 1912, the land station will have to instruct the ship to wait, and such instructions will be communicated in the following manner : — . — . — LMO — . . . LIA . — . — . — 50 . — . . . 10 . — . — .

This means that the station LIA acknowledges receipt of communication from station LMO, and using the service TR notation informs LMO that it has 50 words to communicate, and begs the ship station to wait 10 minutes. In these communications the figures will be transmitted using the abridged notation.

10. *Use of TR Notation.*

Service communications will be preceded by the TR notation.

ART. 11.*—When the text of a radiogram is totally or partially in plain language, the following information will be given in the radiogram :—

1. Total number of compound words as a basis for the charge.
2. Number of plain words in plain language or with a conventional meaning.
3. Number of groups of figures or letters, expressed thus :
20/12/6.

This rule applies specially :—

(a) When a radiogram in plain language contains words of more than 15 letters (international system of counting words) or more than 7 syllables (according to our national rule).

* This article and the article following would appear to be intended to apply rather to purely Argentine working, as they seem inconsistent with the provisions of the International Telegraph and Radiotelegraph regulations.

(b) When a radiogram in code language contains words with more than 10 letters.

(c) When the radiogram contains groups of figures or letters of more than five characters.

ART. 12.—A radiogram must not contain more than 100 words. If the sender needs more words he must divide his communication in as many messages as necessary to comply with the above rule, and these radiograms will be transmitted alternatively with those from other senders presented for the next turn.

Official unprepaid radiograms must not contain more than 50 words.

ART. 13.—(a) Radiotelegraphic messages transmitted, relayed or received will be kept in the utmost secrecy, as well as the note books, traffic sheets, reports and liquidations of accounts. It is forbidden to divulge the contents of communications intercepted during service hours, even if they do not affect the national public service or the naval service.

(b) If an intercepted radiotelegram contains damaging statements affecting national interests in land or at sea, the information must be communicated at once to the Superior of the operator picking up the message, and this operator must keep a memorandum of the text and address of the radiogram concerned.

ART. 14.—It is the duty of every radiotelegraphist to communicate without delay to his superior the contents of intercepted radiograms containing excitations to revolt or affecting the safety of the Nation. This information must be transmitted by the superior officer to a competent authority.

ART. 15.—Radiotelegraphic communications, like ordinary telegrams, are confidential; therefore, persons not belonging to the staffs shall not be admitted into the stations.

ART. 16.—In cases referring to the Radiotelegraphic service, not covered by these regulations, the international radiotelegraphic conventions and the Law on National Telegraphs will apply. But if a rule or regulation is not found, the case must be submitted in consultation to the nearest (superior) office or to the Radiotelegraphic Department.

To insure a good service, it is the duty of coast stations to give to ship stations all the information they may require.

ART. 17.—Radiograms will be delivered following the rules contained in Art. 32 of the Law on National Telegraphs.

SUB-SECTION 4.

CHIEF OF THE PUBLIC MARITIME RADIOTELEGRAPHIC SERVICE.

ART. 1.—The Secretary-General of the Ministry of Marine shall have under his control the Public Radiotelegraphic Maritime Service, and his duties will be as follows :—

(a) He shall supervise all coast stations and ships' stations after installation, both of national and foreign register, calling at national ports, and shall also supervise all coast stations, as prescribed in Article 2 of Law 9127.

(b) He shall control the service of the said stations and will draft the regulations for same, taking care that the rules herein established and the international Conventions accepted by the National Government are duly fulfilled.

(c) He shall see to it that all regulations concerning rates, discounts and reimbursements, as well as any others that may be later on prescribed by the Post and Telegraph Office regarding the requirements of radiograms relayed to the National Telegraph lines are faithfully complied with.

(d) He shall forward to the Office of Posts and Telegraphs all claims made to the Prefect-General of Ports by Steamship Companies, ship captains or passengers referring to rates, discounts and reimbursements.

(e) He shall issue through the Office of the Prefect-General of Ports the permits for the erection of wireless on board those ships which may have obtained leave to do so in accordance with these Regulations.

(f) He shall issue licences to the wireless telegraphists, operating at all stations working within the Maritime Zone, so soon as the conditions affecting such licences have been fulfilled in accordance with these Regulations.

(g) He shall cancel such licences and permits granted to stations and operators within the Maritime Zone as it may, for any good reason, be found necessary to withdraw.

(h) He shall enforce, through the Office of the Prefect-General of Ports, the payment of all fines imposed on shipping companies or ships, and shall direct the deposit of the said fines in the National Bank to the order of the Director of Posts and Telegraphs.

(i) He shall have it in his power to authorise the installation of wireless by private individuals or corporations within the Maritime Zone in accordance with Chapter II., Subsection 1, Art. 5.

ART. 2.—The head of the Public Maritime Radiotelegraphic Service shall act jointly with the Director of Posts and Telegraphs in the following matters :—

(a) In all matters referring to wireless stations installed on the Maritime Zone.

(b) In all matters referring to rates, discounts and reimbursements of the Public Radiotelegraphic Maritime Service in order to obtain a monthly settlement of accounts by the shipping companies or ship captains with the Office of Posts and Telegraphs in conformity with the schedules prepared by the latter.

(c) In the investigation of any questions that may arise for consultation from the Wireless International Service. In all such cases, the Office of Posts and Telegraphs shall communicate with the foreign administrations and authorities concerned.

ART. 3.—The Director of Posts and Telegraphs shall deal directly with the Secretary-General of the Ministry of Marine in all cases relating to the Maritime Radiotelegraphic Service.

ART. 4.—The necessary instructions to give effect to the provisions of Art. 1, paragraph (c), and all other regulations concerning

the internal management of the radiotelegraphic stations in this jurisdiction, will be issued through the Department of Radiotelegraphic Service. These instructions shall be communicated to the stations by means of private circulars.

SUB-SECTION 5.

THE GENERAL OFFICE OF THE PREFECT-GENERAL OF PORTS.

ART. 1.—The duties of the Prefect-General of Ports will be as follows :—

(a) He shall give effect to the provisions made in Articles 4, 5 and 6 of Law 9127 and shall direct the deposit at the Bank of the " Nación Argentina " of the fines imposed for the non-fulfilment of said provisions. The money so deposited must be placed to the order of the Director of Posts and Telegraphs.

(b) He shall receive from shipping companies, captains or passengers all complaints regarding unsatisfactory service in the coast and ship stations, and shall forward them to the head of the Maritime Radiotelegraphic Service.

(c) Should any complaints be made upon the arrival in port of any vessel, the Prefect shall collate the evidence and forward it to the head of the Naval Radiotelegraphic Service, and he shall act in the same manner should the complaints be made in writing.

(d) He shall prevent the departure of any ship which may have failed to make the necessary deposit at the National Bank (to the order of the Director of Posts and Telegraphs) of the fines imposed in accordance with Article 6 of Law 9127.

(e) Both upon the arrival and departure of merchant ships the Prefect shall have the wireless installations inspected in order to ascertain whether they are in perfect working order and whether the power of the apparatus is that fixed by Law 9127.

ART. 2.—The General office of the Prefect-General of Ports will refer all matters concerning ship stations to the Director of the Public Maritime Radiotelegraphic Service.

ART. 3.—Besides the inspection and control of ship stations in territorial waters and on craft of all register the general office of the Prefect-General of Ports must attend to the following :

(1) The dismantling of the transmitting apparatus of the wireless installation as soon as the ship has moored or anchored.

This precaution could be dispensed with, with the consent of the Maritime authority, in the ports of the Southern Coast and in river ports, where no radiotelegraphic land stations are in existence.

(2) He shall ascertain whether the wireless operator or operators have licences corresponding to the installation they are working, in conformity with Article X of the Service Regulations annexed to the London Convention.

(3) In such cases as those covered by Article XII of the Service Regulations above mentioned, the Prefect-General of Ports shall act jointly with the Director-General of Supplies of the Ministry of Marine in order to give effect to the provisions of the said Article.

ART. 4.—First contraventions of the provisions of Art. 5, paragraph 1, will be recorded by the General Office of the Prefect-General of Ports, and each of those following the first will cause a fine of one hundred pesos, national currency.

SUB-SECTION 6.

COAST STATIONS.

Under the Control of the Head of the Maritime Radiotelegraphic Service and Open to the Public.

ART. 1.—The internal organisation and discipline of these stations will be subject to the provisions of these regulations and those that may be enacted hereafter.

ART. 2.—Coast stations not open to the public may or may not appear in the Official Nomenclature Lists at the option of the Minister of Marine.

ART. 3.—Messages cannot be directly received from the public at the coast wireless stations open to the public. Such messages must be presented for transmission at the nearest telegraph office and thence they will be transmitted by telegram to the radiotelegraphic station. Messages can however be received directly from the public radiotelegraph stations in localities where there is no telegraph office or the existing telegraph office is not connected to the radiotelegraph stations.

Another exception to this prohibition is that of private radiograms from men in the Navy Service and addressed to stations in the Ministry of Marine's Zone. Such messages may be accepted at any Ministry of Marine radiotelegraph coast station—connected or not to a local telegraph office—and forwarded to destination provided the corresponding rates are prepaid.

The radiotelegrams referred to in the first paragraph shall follow this route, namely :—

(a) Messages delivered at a Telegraph Office shall be sent by wire to the coast station that is to transmit them to a ship, or to the coast station nearest to the transmitting coast station.

(b) Messages delivered by the public at a radiotelegraphic station will be sent by wireless route to the nearest telegraphic office having efficient connections, and thence by wire to destination or to the coast station that is to transmit them to a ship.

(c) Messages addressed to ship stations that are within the range of the coast station originating them, will be transmitted direct.

Radiograms delivered by the public in coast stations destined either to places inland or abroad, will be accepted only conditionally. The same rule will apply to messages delivered at a telegraph office to be transmitted by wireless when the ordinary telegraph communication is interrupted between the telegraph office taking the message and that at the place of destination.

ART. 4.—The following shall be the *Controlling Stations* for the supervision of the wireless service in general, and particularly for the fulfilment of this Regulation, and of those of the London Convention at all coast and ship stations of the Maritime Zone :

Dársena Norte Station.—This station will control the port of Buenos Aires and its vicinity.

La Paz Station.—This station will control the port of Rosario and its vicinity.

Rio Santiago Station.—Will control the port of La Plata and its vicinity.

Puerto Militar.—This station will control its own port besides Bahía Blanca and its vicinity.

ART. 5.—An inspector appointed by the Ministry of Marine shall control the wireless service at Tierra del Fuego.

ART. 6.—For the purpose of the accounts the coast station in each case shall be considered as terminal station for all messages sent to ship stations and as stations of origin for all messages coming from the ships.

ART. 7.—The coast stations shall give immediate priority to messages of distress sent by ships, and shall forward them over the land lines as urgent messages.

ART. 8.—Coast stations shall not transmit by the telegraph wires unprepaid messages received from ships or from the Ministry of Marine dependencies, if such messages can reach their destination by wireless. Exception, however, is made in the case of "urgent messages" even if unprepaid, which may be delayed through adverse atmospheric conditions or other causes.

ART. 9.—When a ship belonging to the National Navy sends several times the interrupting signal — . . — . . — . . — followed by her call letters, the merchantmen and national coast stations shall immediately suspend their communications in order to facilitate those of the Navy unit. This rule will not apply when the communications being exchanged at the time refer to a shipwreck or danger to lives on sea.

The interrupting signal, which is called "Naval Service," will be sent when authorised by the commander of the respective ship; but only in cases of such urgency that it is not possible to wait for normal service time.

ART. 10.—Excepting in cases of shipwreck, the Darsená Norte Station has priority of working over all others. When this station sends the signal — . . — . . — . . — all other land and national merchant ship stations will cease communicating, to allow Darsená Norte a clear field.

ART. 11.—The National Radiotelegraphic stations will be run by the staffs described in the Official List and in Chapter III., Division One.

ART. 12.—The National Radiotelegraphic coast stations performing service as the National Telegraph lines, will attend to the reception and transmission between them of public service radiograms at fixed hours and for reasonable periods every day; all this to be established by agreement.

ART. 13.—All national ship and land radiotelegraphic stations shall suspend their communications for a period fixed by the stations with authority to do so. The former will in that event receive from the latter the radiotelegraph signal referred to in Articles 9 and 10.

SUB-SECTION 7.

NATIONAL WARSHIP STATIONS.

ART. 1.—Warship and coast stations shall use for official messages the maximum wave-length possible for their aerials, and should they have to transmit messages to Argentine merchantmen or to foreign merchant steamers they must use the wave-lengths specified by the London Convention and by these Regulations.

ART. 2.—In order to avoid difficulties in the general radio-telegraphic service arising from the use by and between Navy units employing Wireless, and which work with the normal wave-length (600 metres)—thus producing interruptions that prevent the reception of other radiograms—this method will be followed, namely:—

1. For Wireless communications in general, between Navy units, their stations shall employ the following wave-lengths:—

1,000 METRES: Ships *Moreno, Rivadavia, General San Martín, General Belgrano, Pueyrredón, Garibaldi, Buenos Aires, 9 de Julio, Presidente Sarmiento, Pampa, Chaco.*

450 METRES: Ships *Almirante Brown, Libertad, Independencia, Paraná, Rosario, Patria, Córdoba, La Plata, Catamarca, Jujuy, Entre Ríos, Misiones, Corrientes, Guardia Nacional, 1° de Mayo, Ministro Ezcurra, Alférez Mackinlay, Ona, Querandi, Azopardo, Piedra Buena, Vicente Fidel López, Uruguay, and Gaviota.*

2. When the distance between ships does not allow of the establishment of wireless communication with the wave-length mentioned above (No. 1), the operator shall use the efficient wave-length that his apparatus may permit.

3. The normal 600 metres wave-length shall be used exclusively for general service between ships and land stations, national or foreign.

4. After the radiotelegraphic communication is established by any means as mentioned above (Nos. 1 and 2), the operator shall endeavour to work, considering the range, with the minimum power required for obtaining effective communication in accordance with the provisions of the London Radiotelegraphic Convention.

5. The syntonisation of the radio-telegraphic stations on board ships of the Navy, shall be controlled and regulated by the Radiotelegraphic Service Department, in accordance with the wave-lengths established by Art. 1 and taking into consideration the normal wave of 600 metres.

SUB-SECTION 8.

WIRELESS ON MERCHANTMEN.

ART. 1.—All merchant vessels, whether mechanically propelled or otherwise, carrying fifty or more persons (passengers and crew) must be fitted with a wireless installation in perfect working order, except in the cases referred to in Articles 4, 5 and 6, below.

The above applies to all craft in similar conditions entering or leaving Argentine ports.

ART. 2.—Wireless apparatus in charge of an efficient operator must have at all times a transmitting power of no less than 200 kilometres for river craft and of no less than 500 for sea craft.

ART. 3.—No ships will be allowed to clear when the above provisions have not been duly complied with, and should captains or ship masters endeavour to avoid or contravene this rule the Superior Port Authority can impose a fine of not less than 1,000 pesos and not exceeding 5,000. Those penalised in that way can appeal to the Federal Court having jurisdiction on the locality where the fault has been committed. The fine will be doubled in cases of repetition of the offence.

ART. 4.—Ships exclusively navigating the rivers of the Republic are exempted from the obligation of carrying wireless on board, but those plying between Argentine and Uruguayan Ports on the River Plate and those employed in the coasting trade must carry radio-telegraphic installations.

ART. 5.—The following are the exceptions to the rule established by Article 1 :

(1) Those ships which only by accident or under exceptional circumstances carry fifty or more passengers, either because the captain has been obliged to get extra help in order to replace the sick members of the crew, or because he has taken aboard the passengers and crew of some vessel in distress.

(2) Those ships on which by reason of the route they follow or because of the conditions in which they set out to sea, it may be considered that the carrying of a wireless installation would be useless and superfluous.

(3) Those ships where the number of passengers may be raised by exceptional or accidental circumstances to 50 or more, owing to their having received on board these additional passengers in the course of the voyage for the purpose of transhipment, with the additional proviso that such vessels do not go farther than 150 miles from the nearest coast.

(4) Sailing ships of primitive construction, such as pontoons and lighters, when it is impossible to fit them with wireless.

ART. 6.—Vessels which have started their voyage without meeting the requirements of these regulations cannot be observed or attended to if, by reason of bad weather or through *force majeure*, they are compelled to seek refuge in Argentine ports.

ART. 7.—All foreign ships carrying wireless installations are divided into three classes according to the classification made regarding ship stations in Article XII of the Regulations annexed to the Radio-telegraphic Convention signed in London on July 5th, 1912. These classes are :—

FIRST CLASS.—Vessels carrying a permanent wireless service

All vessels fitted to carry 25 or more passengers are included in the *First Class*.

(1) If their average speed be of 15 knots or more.

(2) If they have an average speed of over 13 knots ; but only provided they carry 200 or more persons (passengers and crew), and provided also that they traverse a distance of more than 500 nautical miles between two ports of call. These ships, however may be classified under the second class provided that they maintain a continuous watch.

SECOND CLASS.—Vessels having a limited wireless service.

Those ships fitted to carry 25 or more passengers which for some other reasons may not have been included in the first class are included in this second class.

All ships of the second class must, whilst at sea, keep continuous watch during seven hours every day, and watch also for ten minutes at the beginning of each of the remaining seventeen hours.

THIRD CLASS.—To this class belong those ships, national or foreign, carrying a wireless installation without any fixed working hours or not included in the first and second classes.

The owner or builder of a ship included in the second or third class has the right to demand that in the certificate of safety issued to him mention be made of the fact that the ship belongs to a higher class, provided the vessel fulfils the requirements laid down for the higher class.

ART. 8.—National and foreign ships carrying wireless must keep a constant watch in the following cases :—

- (1) Passenger ships running to Montevideo.
- (2) All ships belonging to the first class.
- (3) Ships belonging to the second class, whenever they are at a distance of over 500 miles from the nearest coast.
- (4) Ships carrying more than 50 passengers and which, by reason of their movements, are obliged to navigate at a distance of over 1,000 miles from the nearest coast.

(b) Fishing craft, including whalers, on board of which wireless telegraphy must be carried, are not obliged to keep a continuous watch.

(c) The continuous watch above referred to must be carried out by two or more first class qualified telegraphists, as provided for in Article 10 of the Regulations annexed to the Convention.

ART. 9.—Any ship which must carry wireless and which is classified in the first or second class must have an emergency installation, in accordance with Article 11 of the Regulations annexed to the Radiotelegraphic Convention.

In every case, the emergency installation shall be placed in its entirety on the upper deck of the ship and should be located as high up as possible.

The emergency installation must have a source of energy of its own, must be of such a nature that it can be set in motion very rapidly, and must be capable to work for a minimum of six continuous hours and possess a range of 150 kilometres.

This emergency installation is not required in the case of those ships whose *normal* installations fulfil all the requirements demanded by this Article (as enumerated in the preceding clause).

The licence referred to in Article IX. of the Regulations annexed to the International Radiotelegraphic Convention cannot be granted if the installation fails to comply with the requirements demanded by the said Convention and by the present Regulations.

ART. 10.—All points raised in the Radiotelegraphic International Convention and its Regulations which affect ship stations, the transmission of messages, and the issue of certificates to wireless operators, are governed by the following :

(1) The Rules laid down in the above-mentioned Convention and its Regulations, as well as all the amending Regulations which may from time to time be substituted for them.

(2) The present Regulations whenever their provisions can be considered as additions to the above.

SUB-SECTION 9.

RULES FOR WIRELESS INSTALLATIONS ON NATIONAL MERCHANTMEN.

ART. 1.—All Shipping Companies whose vessels are included in the Regulations laid down in Wireless Law No. 9127 must obtain a permit from the Ministry of Marine and through the Prefect-General of Ports for the installation of wireless stations on their ships.

ART. 2.—Wireless stations on national ships devoted to the conveyance of passengers will be classified as belonging to the first class, and wireless stations on cargo boats will be included in the second class (Article 13 of the Service Regulations annexed to the Wireless Convention).

When Shipping Companies apply for permission to install wireless in their vessels they must indicate the class occupied by such vessels, and this classification must be verified by the Office of the Prefect-General of Ports before forwarding the application to the Secretary-General of the Ministry of Marine.

ART. 3.—As soon as the permit has been granted, and immediately after the stations have been erected on the ship, the company must notify the Prefect-General of Ports, so that the latter may—after previous inspection by the wireless inspector—issue the corresponding licence through the Chief of the Maritime Wireless Service. This licence will be handed over as soon as the charge of 5 pesos (national currency) for the defrayment of expenses has been paid.

ART. 4.—The Ministry of Marine will grant the licence :—

(a) If the wireless installation fulfils all the requirements of the law in the matter of range and also if the installation belongs to a system permitting of its being tuned to the wave-lengths specified in the London Wireless Convention, within an approximation of 5 per cent.

(b) If a deposit to the order of the Director-General of Posts and Telegraphs has been made in the " Banco de la Nación Argentina " of the amount previously fixed by this office as a guarantee for the exchange of radiograms. This deposit must amount at least to one hundred pesos, national currency.

(c) The depositors shall not dispose of the deposit (as provided in (b)), unless they previously notify the administration that their vessels are going to discontinue their registered service, and that sufficient time has elapsed to effect the final liquidation of accounts for radiograms exchanged.

(d) Stations on board ships from a country with which no agreements have been entered into for the exchange of radiograms (between our stations and its ships), will be subject to the conditions (b) and (c). In this case the deposit must be made, before any service is rendered, by the agents of the shipping company owning the vessel.

ART. 5.—Wireless installations on ships belonging to the national merchant service must be furnished with the following papers :

- (1) The licence authorising the installation.
- (2) One copy of the London Wireless Convention.
- (3) One copy of the Wireless Law.
- (4) One copy of the Wireless Regulations.
- (5) The Official List of Wireless Stations, and alphabetical list of call letters.
- (6) Radiogram forms.
- (7) One copy of the standing wireless rates, which must be kept where it can be plainly seen.
- (8) One slate, placed outside the wireless cabin, so that the names of those stations within range may be noted thereon for the information of the public.

ART. 6.—The stations on board national merchantmen must be disposed in such a way that the State's stations may receive the waves emitted by the former.

ART. 7.—Radiotelegraphists are forbidden to operate in unlicensed stations.

It is their duty to report to the Prefect-General of Ports any tentative to compel them to disregard this prohibition.

ART. 8.—(a) When a "licence" is issued the station receives its call letters, which will be published in the Official List of Radiotelegraphic Stations issued by the Berne International Telegraphic Bureau.

Stations licensed for public service "must not use," not even for private purposes, other call letters than those assigned them by the Director of the Maritime Public Radiotelegraphic Service.

(b) The operators in charge of the stations will be responsible or any infringement of the above provision.

ART. 9.—(a) Operators in charge of public service stations are responsible to the Director of the Maritime Public Radiotelegraphic Service for the fulfilment of the provisions contained in the Regulations in force at the time and in the International Radiotelegraphic Convention.

The manager of a station is the chief of the staff serving in the same, and if it is a ship station the manager is responsible to the ship's captain.

The operator in charge of a ship station owes obedience to the captain, and if the latter gives an order against the rules or the International Convention, the operator has the right, acting with tact and courtesy, to call the captain's attention to the fact, pointing out to him at the same time how to avoid the infringement of the rules in carrying through the order received.

(b) The operator in charge shall keep a "book of orders of the station," the pages of which must be numbered. It is forbidden to detach leaves from this book and to use erasers on its pages.

A record will be kept in this book of all orders received from officers with authority to issue them, such as the ship's captain, his substitute, the inspectors representing a Prefect of Ports, etc. Every order will be marked with a number, and in a marginal note the operator will state the date and hour in which it was received; also the place, whenever possible.

The book of orders will be considered as an official document jointly with the "watch book" (*libro de guardia*). The two books will be referred to in case of a lawsuit originated from infringement of the regulations or through other causes.

Whenever required by a competent authority this book shall be submitted for inspection.

Opposite the order (to this effect), in a marginal note, the operator will record the date and hour in which he complied with it.

(c) The operator in charge is responsible for the "service" of the station; therefore, he must see to it that all measures are taken to insure the most efficient service the class of the station calls for—as given in the licence issued by the Director of the Maritime Public Radiotelegraphic Service.

(d) Only the operator in charge is responsible for the accounts or bookkeeping of the station and, unless express orders to the contrary are given, he must prepare the balance-sheets and vouchers thereof.

ART. 10.—The operators in charge of a radiotelegraphic station where an emergency station has been installed according to specifications in the Convention, must verify the perfect running of the emergency station before weighing anchor. The experiments to be carried in this case will be purely local being limited to the test of the generator, the oscillating circuit and the receiving apparatus.

However, if the operator in charge is in doubt as to the range or satisfactory running of the whole set, he may ask any coast station to listen to his call in order to perform any test he may judge necessary. When acting in this way the operator will use the abbreviations given in the international list.

The test will be carried through in this way: the operator will ask for a certain time (*un cierto tiempo*) the transmission of the signal . . . — . in order to verify the receiving set; afterwards, the operator will send the same signal using the emergency transmitting apparatus, thus testing its efficiency and the wave-length.

The operator of the station will record in his "watch book" all the remarks suggested by the test and the result of same. If the

emergency station is found deficient in some respect, the operator will report to the captain so that he may give the necessary orders to have it repaired and in working order, according to the International Convention.

ART. 11.—When a national merchant ship happens to enter a zone where naval manœuvres are being performed by men-of-war using their wireless, the merchant ship must ask for a licence from the chief of operations to send her messages to the land stations, and in so doing she must state the approximate time that will be required to transmit the traffic in hand.

In these communications both the man-of-war and the merchant ship will use the prefix "T.R."

ART. 12.—Whenever these Regulations are infringed information about the facts will be gathered, and in view of the evidence fines will be imposed, according to the national and international laws and regulations governing the telegraphic and radiotelegraphic services. The payment of the fines will not prevent further legal action, as may be required by the nature of the fault.

A "licence" may be cancelled if the findings in the summary show the convenience of so doing.

SUB-SECTION 10.

OFFICIAL CLASSIFICATION, RATES, COLLECTIONS, AND ACCOUNTS IN ALL KINDS OF RADIOTELEGRAPHIC STATIONS.

ART. 1.—To make up and liquidate the accounts concerning radiograms received from the public at the coast stations, the following method will be observed :

(a) If there is no postal or telegraph office in the locality, the money corresponding to this service will be paid to the Post and Telegraphs Treasury through the Administrative Section under the Director-General of the Ministry of Marine.

(b) If there is a postal or telegraph office in town, the payments referred to in (a) will be made to it, daily, the wireless coast station getting a receipt for every remittance.

(c) In places where there is a telegraph office, the coast station shall receive messages from the public when the former is out of connection with the telegram system, and the tolls collected will be paid by the latter to the telegraph office, as stated in (b).

ART. 2.—Radiograms from the personnel of the national Navy and ships belonging to other State services, will be exempted of the tolls caused at the State ship and coast stations, but not of those corresponding to the land lines.

When such radiograms as those referred to in this article do not use land lines, their transmission will be charged according to the lowest (*simple*) telegraphic rates.

ART. 3.—No charge will be made in radiograms exchanged direct by officers of the Navy between the Ministry of Marine's Wireless Stations, provided such radiograms refer to public service questions.

ART. 4.—The collection of tolls on private radiograms from ships of the Navy or other public services is subject to the following rules :—

(a) Radiograms from the personnel mentioned in Art. 2 and those addressed to any of the national wireless stations to be forwarded by land lines to men in the service, are subject to the ordinary telegraph rates and the amount in full must be paid to the operator or chief of the station, just as telegraphic messages are paid for in land offices. The operator will issue in every instance a receipt of the amount collected.

(b) Every day the operator in charge will hand over to the ship's purser the money received for private messages sent out, and the purser will give a receipt of the amount.

(c) The pursers of ships stationed between La Plata and the Buenos Aires Ports will pay out every month to the Arsenal Administrative Department the money received from the operators in charge. This payment to be made according to paragraph (a), Art. 1 of this Sub-section.

(d) The same operation will take effect every month in the arsenal and ships anchored in the military port, where the Administrative Department will hand over the money received directly to the Telegraph office at that port.

(e) In the case of ships out at sea, the deliveries of money will take place as stated in paragraphs (c) and (d), the payments to be made within 24 hours of arrival at their jurisdictional port, if such arrival occurs after the day fixed for settlement of accounts.

ART. 5.—Any claim arisen from differences in the accounts submitted will be presented by the Director-General of National Posts and Telegraphs to the Chief of the Maritime Public Radiotelegraphic Service.

ART. 6.—Ships and service sections with wireless stations belonging to Ministries (other than the Interior and Marine) will settle the radiotelegraphic accounts according to agreements they will enter into with the Director-General of Posts and Telegraphs.

ART. 7.—Shipping companies will settle monthly their accounts with the Administration of Posts and Telegraphs. The settlement will be made according to the statement of account that the latter office will prepare and forward to every shipping company.

ART. 8.—Telegraph and radiotelegraph rates at present in force are those published in the pamphlet "National Postal and Telegraphic Schedule of Charges," 1917 edition, and in the "Official List" of International Radiotelegraphic Stations.

National stations will apply the rates therein given.

ART. 9.—With the amount of tolls collected in the public service by the States and National Shipping Companies' stations (which amounts are paid to the Administration of Posts and Telegraphs as provided in these Regulations) the following documents will be submitted : the list of radiograms exchanged with the necessary information to identify them, and the original of every message sent, relayed and received.

These originals will be placed in a sealed envelope, to be opened only by the Administration of Posts and Telegraphs.

ART. 10.—One copy of the list (mentioned in Art. 9) shall be sent in the first five days of every month to the Radiotelegraphic Department, Ministry of Marine. Shipping companies' stations shall forward these lists through the office of the Prefect-General of Ports.

ART. 11.—A separate list will be made of the official radiograms exchanged between the Navy units and between these units and the national coast stations, when the last is their final destination. This list will be sent only to the Radiotelegraphic Department, also in the first five days of every month, and must be accompanied by the originals of the radiograms exchanged (received, relayed and transmitted) as provided by Art. 9.

ART. 12.—Coast and ship tolls will be liquidated between the Director-General of Posts and Telegraphs and the foreign administrations or companies controlling the stations intervening in the exchange of radiograms, according to Art. XIII of International Radiotelegraphic Regulations.

ART. 13.—The tolls collected on account of public service radiotelegrams exchanged direct between ships owned by the same company shall not be paid to the Administration of Posts and Telegraphs, but the corresponding list of messages and their originals shall be supplied as provided above.

ART. 14.—The accounts for direct radiotelegraphic exchange between Argentine merchant ships or between Argentine and foreign ships, will be settled between the respective companies, and to this effect in each case the receiving station will make the corresponding charge to the transmitting station, but the list of messages and the originals of the messages exchanged will be supplied by the stations on board national ships.

ART. 15.—The Director-General of Posts and Telegraphs shall include in the official list of telegraphic offices the data *re* national licensed coast and ship stations existing in the country, and the list will be kept for reference and consultation by the public at every telegraph office in the Republic. The necessary information to prepare this list—as detailed below—will be supplied by the Ministry of Marine to the Director of Posts and Telegraphs, viz. :—

(a) *Inland and Coast Stations.*—Name, geographical position as shown by the territorial sub-division of the country, and longitude and latitude of the place.

Ship Stations.—Name of the vessel, and—if essential—name of the owner or owners.

(b) Call letters. (Every group of call letters must contain three letters and shall be differently arranged for each station.)

(c) Normal range.

(d) Radiotelegraphic system employed and characteristics of the transmitting set.

(e) The several wave-lengths employed by the station. The normal wave-length to be underlined.

(f) Class of service rendered by the station (communication with ships, general public correspondence, private correspondence, long-distance public correspondence, special correspondence, exclusively official, etc.).

(g) Service hours of the station.

(h) The time and how the signals are sent out, and the meteorological notices, when the station attends to this kind of service.

(i) Coast and ship rates.

The list will contain, as well, the information communicated to the Berne Bureau relating to radiotelegraphic stations not opened for general public correspondence.

In designing radiotelegraphic stations, the following abbreviations will be made use of :—

PG—Station open to general public correspondence.

PR—Station open to restricted public correspondence.

P —Private station (*Estación de interés privado*).

O —Station open exclusively to official correspondence.

N —Permanent Service Station.

X —Station without fixed hours service.

In cases of homonymy, the name of a ship station will be immediately followed—in the first column of the list—by the corresponding call letters.

ART. 16.—In the counting of words to collect the tolls, the rules given in the regulations annexed to the Petrograd Convention will be followed.

ART. 17.—The originals of public service radiograms and all documents appertaining to same will be safely kept by the Direction-General of Posts and Telegraphs during 15 months, counting from the month following that in which the originals were received at that office.

ART. 18.—Reimbursements originated by the exchange of radiograms with the State's stations will be settled in accordance with the provisions of the International Telegraphic and Radiotelegraphic Convention.

ART. 19.—In the application of the schedule of charges corresponding to messages issued from or addressed to radiotelegraphic stations established in places where no telegraph office is in existence, such stations will be considered as national telegraph offices and the radiotelegraphic rates will be applied only to messages exchanged with ship stations.

CHAPTER III.

NAVY RADIOTELEGRAPHIC STATIONS SERVICE.

SUB-SECTION I.

STATION'S STAFF—DUTIES AND POWERS.

ART. 1.—The staff in every station will consist of one operator in charge and the number of subordinate trained operators required to keep the watch. The number of these operators will be fixed by the Radiotelegraphic Department.

In case of vacancy or temporary absence from the station of the operator in charge, his place will be filled by the operator of highest category or, between men of the same category, by the senior in the service.

Operators in charge shall depend directly from the signal officers.

ART. 2.—The operator in charge is responsible to the Department or to the signal officers—as the case may be—both for the proper running and upkeep of the station apparatus and for any lack of attention in the performance of the service. The operator in charge, however, may have the responsibility devolved upon the subordinate who was in the watch at the time the breakdown or inattention took place.

ART. 3.—When the station is short-handed, the operator in charge will do watch duty as the subordinate, but the former will be at liberty to choose the hours for his watch.

ART. 4.—The hours of watch corresponding to each operator will be fixed beforehand, considering the class of service to be rendered and the number of men in the staff of the station.

ART. 5.—Ship commanders or managers of other public services have authority to increase temporarily the staff of the stations depending from them, when, on account of manœuvres or other similar service, they consider it essential to insure efficient communications.

ART. 6.—To define justly the responsibility attaching to each operator in connection with breakdowns in the apparatus or omissions in the fulfilment of duties, each operator on taking up his watch will sign in the watch book an entry stating the condition in which he receives the apparatus, the hour of his coming in and all other particulars that may help later on to establish responsibilities. This entry shall be signed also by the operator leaving the work.

ART. 7.—Every time a watch is relieved the operator going out will communicate to his relief all information in his possession concerning the service and useful in the proper performance of the duties.

ART. 8.—When, on account of atmospheric discharges, it is dangerous to keep the apparatus ready to work, the antenna shall be connected to earth, and this fact will be recorded in the watch book stating the hour in which the interruption took effect and that in which connection for work was re-established. During the period of interruption, the operator shall test the atmospheric conditions every 30 minutes, and he will reconnect the antenna immediately the discharges cease.

ART. 9.—The managers of special services and the commanders of ships shall see that the archives of radiotelegrams—official and private—are kept in due order and with all the information required; also the stub-book of receipts. To this effect the signal officer or the officer in charge of the bookkeeping, will inspect the station with due frequency.

ART. 10.—The *Dársena Norte* station is the "Service Central Station," and upon its call the other stations shall stop their communications unless the messages are *very urgent*, in which case the transmission shall be carried on to the end. "Very urgent" messages, are those asking for assistance and those transmitting orders from

H.E. the President of the Republic, the Minister of Marine and the Commanders of fleets engaged in manœuvres.

ART. 11.—Time service in force for coast and fixed ship stations is as follows :—

Dársena Norte	Permanent (N) .
Río Santiago	" "
Faro Recalada (<i>Recalada Light-house</i>)	9—11 m. ; 2—4 s. ; 8—12 s.
Pontón estacionario de Prácticos (<i>Stationary Pilots' Pontoon</i>) ..	9—11 m. ; 2—4 s. ; 8—12 s.
Faro Mogotes (<i>Mogotes Lighthouse</i>) ..	Permanent (N)
Puerto Militar (<i>Military Port</i>) ..	" "
Comodoro Rivadavia	" "
Cabo Virgenes	" "
Año Nuevo	6 s.—6 m.
Río Grande	6 m.—6 s.
Ushuaia	Permanent (N)
La Paz	12 m.—12 s.
Posadas	" "
Formosa	" "
Puerto Aguirre	" "
San Julian	Permanent (N)

ART. 12.—Commanders of ships navigating along or towards Argentine coasts will have observed on their "R.T." stations the following hours :—

Ships with three or more radiotelegraph operators :—

	Permanent Service.
Ships with two operators	7 m.—11 m.
" " " " "	2 s.—6 s.
" " " " "	8 s.—12 s.
Ships with one operator	8 m.—11 m.
" " " " "	2 s.—4 s.
" " " " "	9 s.—11 s.

Whenever a complaint is made, a full explanation as to the reasons of delay or other cause of complaint shall be given, and to this effect a record of the facts will be entered in a special Watch Book. This book will be kept by the operator in charge and viséed by the signal officer. Coast stations may call at any hour the ship they want to communicate with. In case of delay, the coast station will regulate its work so as to pick up the ship station at the first opportunity.

Ship commanders may call at any hour the permanent service stations, but, in normal circumstances, they should arrange their calls to other stations in accordance with the latter's hours of working.

Calls for assistance are to be made at any time they are required.

Stations with intermittent service shall attend an urgent call the moment it is heard, whether or not within their regular service hours.

For the purposes of this article the hour is that of the Córdoba meridian.

SUB-SECTION 2.

GENERAL RULES.

ART. 1.—It is absolutely forbidden to the operators to maintain dialogues by wireless; their conversations will, in every instance, be limited to the subjects strictly essential to render a good service.

ART. 2.—Whenever a radiogram is transmitted with a delay of more than 30 minutes after it was handed in, it shall be endorsed with an explanation of the delay, which is to be recorded in the watch book.

ART. 3.—When a station calls repeatedly for another and cannot get an answer in more than five minutes, the fact will be recorded in the watch book and also the object of the call. Other stations within the range of the calling station shall record, as well, the call and the omission to answer it. These records will serve to establish the responsibility for possible delays in the transmission or reception of messages.

ART. 4.—When a station "causes a wait" (*da una espera*) of more than ten minutes, the two stations concerned shall record the fact in their respective watch books, the transmitting station giving the classification of the radiogram it has for transmission, and the receiving station, the cause of the "wait."

The transmitting station shall remind every ten minutes the receiving station of its being waiting, and the reminders will continue until the radiogram in hand is transmitted.

ART. 5.—Whenever trouble occurs in the receiving apparatus causing a delay of more than ten minutes, a record of the nature of the trouble will be made in the watch book in order to fix responsibilities. The operator in charge will make a similar record whenever he is unable to answer a call through lack of current in the transmitting set, the burning out of a fuse, or other alike accident.

ART. 6.—While two stations are in communication, it is absolutely forbidden to the others to interrupt them by calling out a third station, unless the call is to transmit a "very urgent" radiogram or a "general call" from the flagship. However, even in the cases just mentioned the interruption should be made only at the moment the station that is sending messages completes one of them. When this is accomplished the interrupting station shall give the signal of general interruption and the prefix corresponding to either of the very urgent messages above mentioned, which are to have priority in transmission and reception.

ART. 7.—When a ship moors at a port, navy yard or dockyard, her wireless plant will be closed after a thorough cleaning of its parts.

ART. 8.—To avoid the damages which are likely to occur in wireless stations of resonant spark, on account of the spark gaps being short circuited, the electrodes shall be thoroughly cleaned once a week.

The officer on duty shall be present at the cleaning and will see that it is made properly and thoroughly. To ascertain that the operation has been carried through without impairing the efficiency of the apparatus, the officer will remove the mica washers and will see whether

—without them—the contact between each pair of electrodes is perfectly uniform both in the copper rings and the silver discs.

ART. 9.—Radiograms referring to urgent family matters of men in the Navy service and issued from a Navy ship to Dársena Norte station, may be sent thence to destination by telephone, if the sender so desires. This will not alter the charges provided the expression “T.C. Naval” follows the signature.

ART. 10.—Arsenal and Dockyard Commanders shall take care that the radiotelegraph operators under their command attend in the most thorough manner to the cleaning and maintenance in good order of wireless apparatus on board ships anchored therein. The same commanders will see to it that the operators practise with reasonable frequency in sending and receiving messages.

ART. 11.—It is the duty of the staff of a ship station anchored in a navy-yard or military zone, to serve in the land stations in the neighbourhood. If one of the latter is closed for repairs, the operators shall report for duty at the station on board the ship appointed to replace the temporarily closed station.

When the number of available operators is rather large, the Commander of the Navy-yard or of the Military Zone will appoint the hours of service corresponding to each operator.

ART. 12.—Complaints referring to misdirected, altered or delayed radiograms should be forwarded by the sender of the message to the captain of the ship whence it was transmitted.

The complaint must contain the number of the radiogram, the hour of transmission, the receiving station and the name and address of the addressee.

The ship commander will give the necessary instructions to have the information supplied duly checked and all the papers referring to the case shall be sent to the Secretary-General of the Ministry.

Every complaint must refer to one radiogram only.

SUB-SECTION 3.

SPECIAL BOOK-KEEPING OF THE NAVY STATIONS.

ART. 1.—All coast and ship stations shall forward to the Radiotelegraphic Department, Ministry of Marine, in the first five days of every month, two copies of the sheets showing the monthly traffic of both official and public radiograms.

The same stations shall forward, every quarter, a statement of the supplies spent and a requisition of the supplies wanted.

ART. 2.—As often there are divergencies in the international radiotelegraphic service as to the number of words contained in the radiograms sent and received abroad through stations in national men-of-war, these ships shall forward to the Radiotelegraphic Department, Ministry of Marine, an authenticated copy of every message exchanged between them and foreign stations.

Such copies shall be forwarded immediately after the arrival of ships in home waters, so that the Department will be in advance in a position to answer the Administration of Posts and Telegraphs consultations on this subject.

ART. 3.—In all matters relating to management and book-keeping, independent radiotelegraphic stations shall address direct to the Radiotelegraphic Department.

CHAPTER IV.

SUB-SECTION I.

TEMPORARY MEASURES.

ART. 1.—Before accepting messages addressed to places abroad, the radiotelegraph stations depending from the Maritime Service shall find out by addressing the corresponding coast stations whether such messages can be forwarded. This provision shall remain in force during the present universal conflict.

ART. 2.—In accordance to the provisions of articles 8 of the Telegraphic Convention and 17 of the Radiotelegraphic Convention, the Argentine Government shall not accept hereafter any code messages for abroad. All telegrams and radiograms shall be written in plain language and the languages that can be used are Castilian, English, French, German, Italian and Portuguese. The messages must be signed in full and the transmission shall be made at the sender's risk.

Government's messages are exempted from the above (August 18th, 1914).

ART. 3.—In order to regulate the exchange of messages between merchant-men and men-of-war and the coast stations at *Dársena Norte* and *Faro Mogotes*—which have the largest share of traffic—*Mogotes* shall communicate to *Dársena Norte*, every day at 7 a.m., and *Dársena Norte* to the Director-General of Posts and Telegraphs, the list of ships within their respective ranges.

If during the day more ships with which it is likely to have an intense exchange of messages, enter the radius of the named stations, the fact shall be communicated (at once) to the Director-General of Posts and Telegraphs, as established above.

A record of these communications shall be kept at each station giving the name of the ships, the hour at which their arrival within range was reported and other relevant information to hand.

ART. 4.—As from the 1st of May, 1917, a new extension of one year is granted to the National Shipping Companies to fulfil the requirements established by the Regulations for the Radiotelegraphic Service.

PART II.

The second part of the Argentine Regulations deals with the following subjects :

RADIOTELEGRAPHIC STAFFS.

Army recruits belonging to the radiotelegraphic profession.

School for Recruits who are Radiotelegraphists :—

Regulations and Plan of Studies for the Radiotelegraphic Staffs.

School of Apprenticeship.

Course of Lectures in the School of Radiotelegraphy.
Examinations.
Percentages.
Operators from the School of Mechanics.

School of Radiotelegraphy :—

Programme of the Course.

Marine Operators :—

Conditions ; Examination.
Programme of the Course.
Official Forms.

N.B.—*In an Appendix annexed to the official publication entitled "Regulations Governing the Radiotelegraphic Service in the Argentine Republic" will be found the Radiotelegraphic and Telegraphic Conventions, which are versions in Spanish of the general Conventions and Regulations which figure elsewhere in our volume.*

C TEMPORARY MEASURES.

On May 6th, 1915, the President of the Republic issued a modifying Decree which reads as follows :—

"Whereas the state of war in Europe has created a special situation in this country which makes it extraordinarily difficult for national steamship companies to procure radiotelegraphic apparatus and other material for the strict fulfilment of what is set forth in Article 7 of Law No. 9127 and Article 43 of the Radiotelegraphic Service Regulations,

"THE PRESIDENT OF THE ARGENTINE REPUBLIC DECREES THAT

"An extension of the time limit of one year as from May 1st will be granted to national steamship companies in which to comply with the stipulations set forth in Law 9127 and Article 43 of the Radiotelegraphic Service Regulations."

And the following was also enacted by him :

EXPLANATORY DECREE.

1. Any ship provided, on the date of the Decree, with a radiotelegraphic station of shorter range than that given as obligatory according to Law 9127 will continue to use its present station subject to the restrictions imposed by previous resolutions.

2. Ships which had no station, on the date of the Decree, shall be under no obligation to make an installation until the extension of time granted shall have lapsed.

3. All ships now having a station of less range than that specified in Law 9127, and those having no station at all, must fulfil the conditions of said law before May 1st, 1916.

4. All ships which in the interval fulfil the conditions of Law 9127 and Article 43 of the Radiotelegraphic Service Regulations will be granted their respective licences in a definitive form.

AUSTRALIA (COMMONWEALTH OF)

THE territory of the Commonwealth includes the Continent of Australia, the island of Tasmania, and part of the island of New Guinea (Papua). The area of the continent itself is 2,948,366 English square miles, whilst the inclusion of the island of Tasmania, which possesses an area of 26,215 square miles, brings the gross superficies to a total of 2,974,581 square miles.

For the entire Commonwealth this gives a coastline of 12,210 miles, with an average of 244 square miles for each mile of coastline. According to Strelbitski, Europe has only 75 square miles of area to each mile of coastline, and according to the recent figures England and Wales have one-third of this—25 square miles. Geographically, the continent lies between $10^{\circ} 41'$ and $39^{\circ} 8'$ south latitude, or including Tasmania $43^{\circ} 39'$ south, and between $113^{\circ} 9'$ and $153^{\circ} 39'$ east longitude; the greatest distance east to west being 2,400 miles, and that from north to south 1,971 miles.

The Government is a Federal Commonwealth Government—the Executive power vested in the Sovereign (acting through the Governor-General), assisted by the Executive Council of seven Ministers of State and such honorary Ministers as may be appointed thereto. The constitution rests on the fundamental law of March 16th, 1898, ratified by the Imperial Parliament on July 9th, 1900, and the Commonwealth was inaugurated January 1st, 1901.

ORGANISATION OF RADIOTELEGRAPHY.

Originally radiotelegraphy was organised in Australia under the supervision of the Postmaster-General, the Naval Department exercising jurisdiction independently over their own radiotelegraph stations. In 1915 this duplication was abolished; the control throughout the entire Commonwealth being definitely placed in the hands of the Naval Authorities. The first sets erected were those at Point Lonsdale, in Victoria, and that near Devonport, Tasmania. Both of them date from 1905.

The land stations controlled by the Government are 21 in number, being those of Hobart, King Island, Flinders Island, Melbourne, Sydney, Brisbane, Rockhampton, Townsville, Cooktown, Thursday Island, Port Moresby, Darwin, Wyndham, Broome, Roebourne, Geraldton, Perth Esperance, Adelaide, Mount Gambier, and Samarai.

There are no private land stations and no experimental stations.

There are a number of ship stations on Government vessels as well as on vessels privately owned, but owing to the present state of war it is not possible to supply details of this class of installation.

PUBLIC DEPARTMENTS CONTROLLING WIRELESS TELEGRAPH OPERATIONS.

Official.	Title.	Address.
J. A. Jensen	Minister of the Navy	Sydney.
F. G. Creswell, R.A.N.	Acting Director of Radiotelegraphic Service	Sydney.
A. F. Newman, R.A.N.	His principal Assistants.	
G. J. Weston, R.A.N.		
W. T. S. Crawford		
F. G. Creswell, R.A.N.	Chief Engineer (Wireless Section)	Sydney.
C. B. Cutler	His principal Assistants.	
A. S. McDonald		
F. J. Henderson		
S. Rolls		

WIRELESS LEGISLATION.

The Act to Regulate Radiotelegraphy in Australasia was passed in 1905, and appears *in extenso* in THE WIRELESS YEAR BOOK for 1913, page 118. A number of additions and modifications were introduced by the Wireless Telegraphy Act No. 33 of 1915, and this amended text will be found below, it being the extant Governing Decree under which wireless is at present administered.

The licences issued to the various classes of individuals and corporations follow the same lines as those utilised in the Mother Country (see under Great Britain), and it is not, therefore, thought necessary to reprint them here. In 1912 the Commonwealth Parliament passed the Navigation Act, wherein is contained a clause which makes it compulsory for ships trading in Australian waters to be fitted with radiotelegraphic apparatus. This is provided for in Section 231 of the Act, and the text of that section will be found below with other information in accordance with the following list.

We append the text of current radiotelegraphic legislation in accordance with the following list:—

A—Wireless Telegraph Act, 1905 (No. 8), as amended by No. 33 of 1915.

B—Wireless Telegraph Regulations, 1916.

C—Form of Licence.

D—Navigation Act, 1912 (Sec. 231).

ACT NO. 8 OF 1905.

(As amended by the Wireless Telegraphy Act, No. 33 of 1915.)

A 1. *Short Title*.—This Act may be cited as the Wireless Telegraphy Act, 1905.

2. *Interpretation*.—In this Act—

“Australia” includes the territorial waters of the Commonwealth and any territory of the Commonwealth;

“Wireless Telegraphy” includes all systems of transmitting and receiving telegraphic messages by means of electricity without a continuous metallic connection between the transmitter and the receiver.

3. *Exemption of Ships of War*.—This Act shall not apply to ships belonging to the King's Navy.

4. *Exclusive Privileges.*—The Minister for the time being administering the Act shall have the exclusive privilege of establishing, erecting, maintaining, and using stations and appliances for the purpose of—

- (a) transmitting messages by wireless telegraphy within Australia, and receiving messages so transmitted, and
- (b) transmitting messages by wireless telegraphy from Australia to any place or ship outside Australia, and
- (c) receiving in Australia messages transmitted by wireless telegraphy from any place or ship outside Australia.

5. *Licences.*—Licences to establish, erect, maintain, or use stations and appliances for the purpose of transmitting or receiving messages by means of wireless telegraphy may be granted by the Minister for the time being administering the Act for such terms and on such conditions and on payment of such fees as are prescribed.

6. *Penalty for Breach of Act.*—(1) Except as authorised by or under this Act, no person shall—

- (a) establish, erect, maintain, or use any station or appliance for the purpose of transmitting or receiving messages by means of wireless telegraphy; or
- (b) transmit or receive messages by wireless telegraphy.

Penalty: Five hundred pounds, or imprisonment with or without hard labour for a term not exceeding Five years.

Ships Fitted with Apparatus for Wireless Telegraphy.—(2) Subsection (1) of this section shall not, except as prescribed, extend to appliances maintained on any ship, arriving from any place beyond Australia, for the purpose of enabling messages to be transmitted from or received on that ship by means of wireless telegraphy, but all such appliances shall, while the ship is within Australia—

- (a) be subject to the control of the Minister for the time being administering the Act; and
- (b) only be used by his authority or as authorised by the regulations.

Penalty: Five hundred pounds.

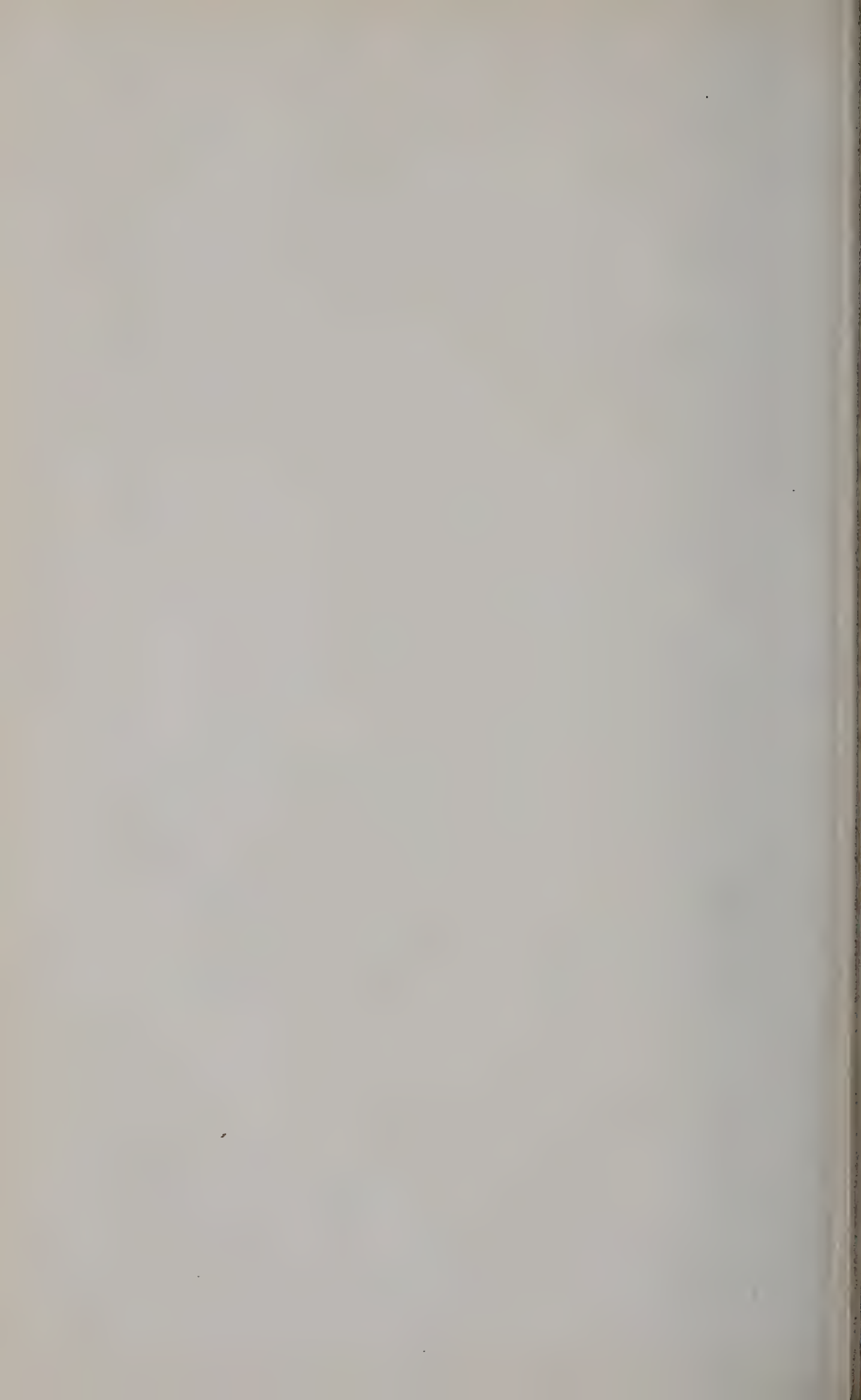
7. *Forfeiture of Appliances Unlawfully Erected.*—All appliances erected, maintained, or used in contravention of this Act or the regulations, for the purpose of transmitting or receiving messages by means of wireless telegraphy, shall be forfeited to the King for the use of the Commonwealth.

8. *Search Warrants for Appliances Unlawfully Erected.*—(1) If a justice of the peace is satisfied by information on oath that there is reasonable ground for supposing that any appliance is established, erected, maintained, or used in contravention of this Act or the regulations, for the purpose of transmitting or receiving messages by means of wireless telegraphy, he may grant a search warrant to any person.

(2) A search warrant under this section shall authorise the person to whom it is addressed to break and enter any place or ship, where the appliance is or is supposed to be, either by day or by night, and to seize



AMERICAN BATTLE CRUISER SHOWING WIRELESS AERIALS.



all appliances which appear to him to be used or intended to be used for transmitting or receiving messages by means of wireless telegraphy.

9. *Proceedings in Respect of Offences.*—(1) Proceedings for any offence against this Act may be instituted in any Court of Summary Jurisdiction, and any person proceeded against under this section may be dealt with summarily or may be committed for trial.

(2) The Court in dealing summarily with any accused person under this section may, if he is found guilty of any offence against this Act, punish him by imprisonment with or without hard labour for any period not exceeding six months, or by a penalty not exceeding Fifty pounds.

10. *Regulations.*—The Governor-General may make regulations, not inconsistent with this Act, prescribing all matters which by this Act are required or permitted to be prescribed or which are necessary or convenient to be prescribed for carrying out or giving effect to this Act.

REGULATIONS AFFECTING WIRELESS TELEGRAPHY.

B 1. *Short Title.*—These Regulations may be cited as the “Wireless Telegraphy Regulations, 1916.”

2. *Definitions.*—In these Regulations, unless the contrary intention appears—

“Australian ship” means a ship registered in Australia;

“British ship” means a British ship other than an Australian ship;

“Foreign ship” means a ship other than an Australian ship or a British ship;

“Harbour” includes any harbour properly so called, whether natural or artificial, or any estuary, navigable river, pier, jetty, or other work in or at which a ship can obtain shelter, or ship or unship goods or passengers;

“Land Station” means a station, not being a ship station, for the transmission and receipt of messages by means of wireless telegraphy.

“Ship Station” means a ship (not permanently moored) having installed thereon appliances for the transmission and receipt of messages by means of wireless telegraphy;

“Territorial Waters” means the territorial waters of the Commonwealth and those of any territory of the Commonwealth, and includes harbours;

“The Act” means the *Wireless Telegraphy Act, 1905-1915*;

“The Minister” means “The Minister of State for the Navy”;

“Naval Board” means the Naval Board of Administration appointed under the Naval Defence Act;

“Naval Secretary” means the Secretary to the Naval Board of Administration.

3. *Permits.*—(1) The Naval Board may, at their discretion, grant permission for technical schools and similar institutions to conduct experiments in Radiotelegraphy for the purpose of training students.

(2) The applicant for such permission shall satisfy the Naval Board that the experiments will be conducted only for the purpose of training

students, and shall furnish, with his application, a complete list of the material intended to be used, together with the name and credentials of the person who, it is proposed, will give the instruction.

(3) The applicant shall further agree to allow Inspectors attached to the Radiotelegraph Branch of the Department of the Navy free access to the premises in which the experiments are carried out, for the purpose of inspection, as and when required.

(4) The permission shall be granted without charge, but the Naval Board reserve the right to withdraw such permission at any time, and their decision in the matter shall be final.

4. *Licences.*—(1) A licence shall be granted only in respect of a ship station on an Australian ship.

(2) A licence shall be for a period of one year from the date thereof, but may be renewed from time to time.

5. *Fee for Licence.*—The fee for a licence shall be one pound, and shall be paid in advance.

6. *Application for a Licence.*—(1) An application for a licence must be in writing, and must set out the following particulars:—

(a) the name of the ship in respect of which the licence is applied for;

(b) the port in Australia at which the ship is registered; and

(c) the system of wireless telegraphy to be used on the ship.

(2) Before granting the licence the Minister may require the applicant to furnish such additional particulars as he thinks necessary.

7. *Condition as to Syntony, etc.*—Before any licence is granted the applicant must satisfy the Minister that the wireless telegraphy apparatus or appliances to be worked in pursuance of the licence complies with the Regulations for the time being in force governing syntony and wave length.

8. *Licence to be in Triplicate.*—(1) Every licence shall be made out in triplicate, and two parts shall be issued to the licensee and the other retained in the Department of the Navy.

(2) Before the licence is issued to the applicant he shall execute the part of the licence to be retained in the Department.

9. *Renewal of a Licence.*—(1) A licence may be renewed by writing thereon or attaching thereto a memorandum stating the period for which it is renewed.

(2) The memorandum of renewal must be signed by the Minister or by the Naval Secretary.

(3) The renewal may be made at any time within one month before or one month after the expiry of the licence.

(4) The memorandum is to be written on each part of the licence, but in the case of the licensee's parts it shall be in the form of a receipt for the renewal fee signed by the Minister or by the Naval Secretary, which receipt is to be attached by the licensee to his part.

10. *Revocation of Licence.*—The Minister may, by notice in writing, revoke and determine any licence, on the ground of the licensee having failed to comply with any Regulation for the time in force under the *Wireless Telegraphy Act, 1905-1915*, or on any other ground specified in the licence.

11. Powers of Inspection.—The Naval Board or any person authorised in writing by the Naval Board may at all reasonable times enter upon any ship station on which wireless telegraphy appliances are installed, or are in course of being installed, in pursuance of a licence, and may inspect such appliances and the working and user thereof.

12. Communications between Ship and Land Stations.—When communications are made by means of wireless telegraphy between a ship (whether British, foreign, or Australian) in territorial waters and a wireless telegraph station on land, the rules in force for the working of wireless telegraphy at that station shall be observed.

13. Application of the Radiotelegraphic Convention and Regulations.—The provisions of the Radiotelegraphic Convention and the Service Regulations for the time being in force thereunder, so far as such Convention and Regulations are applicable, shall apply to all wireless telegraphy installations available for the transmission or receipt of private messages, whether installed by the Commonwealth or under licence, and whether at land stations or ship stations, and to all messages handled by such installations, and every licensee shall comply therewith.

14. Appliances to be Worked so as to Avoid Interference with other Appliances.—(1) The wireless telegraphy appliances on board any ship (whether an Australian ship, a British ship, or a foreign ship) in territorial waters shall be worked in such a way as not to interrupt or interfere with—

(a) Naval or Military signalling; or

(b) the transmission of messages between other wireless telegraph stations.

(2) In this Regulation Naval or Military signalling includes signalling or communicating, by means of any system of wireless telegraphy, by the King's Imperial or Dominion Naval or Military Forces.

15. Appliances not to be worked while Ship Moored to any Wharf or Pier.—Except by permission of the Naval Board, the wireless telegraphy appliances on board any Australian ship, British ship, or foreign ship (other than a ship of war) shall not be worked or used while the ship is moored to any wharf or pier in Australia or any territory of the Commonwealth.

16. Application of Defence Regulations to Foreign Ships of War in Harbours.—The use of wireless telegraphy appliances, on board any foreign ship of war while in any harbour in Australia or any territory of the Commonwealth, shall be subject to such rules (whether prohibitive or regulative) as the Governor-General may think fit to make.

17. Powers of Governor-General in Emergencies.—If at any time an emergency has arisen in which it is expedient that the Commonwealth Government should have control over the transmission of all messages by wireless telegraphy, the Governor-General may by notice in the *Gazette* prohibit for such period as he thinks necessary the use of wireless telegraphy on board foreign ships in territorial waters.

18. Control of Communications and Appliances in Emergencies.—(1) In case of emergency, the Naval Board or any officer in command

of any ship of war of His Majesty's Navy (whether Imperial or Dominion), or any officer in command of any part of the Defence Force, may—

- (a) take possession of any wireless telegraphy appliances installed on any ship in pursuance of a licence, and use such appliances for the King's service; or
- (b) place any person in control of any such appliances; or
- (c) direct the licensee or person in charge of such appliances to submit to him all or any messages tendered for transmission or received by means of such appliances; or
- (d) stop or delay or direct the licensee or person in charge of such appliances to stop or delay the transmission or delivery of any such messages or to deliver them to him; or
- (e) direct the licensee or person in charge of such appliances to comply with all such directions as he thinks fit to give with reference to the transmission or receipt of messages by means of such appliances.

(2) Every licensee and every person in charge of any wireless telegraphy appliances installed in pursuance of a licence shall comply with this Regulation, and all directions issued in pursuance thereof.

(3) Reasonable compensation shall be payable to the licensee for any damage to the appliances arising in consequence of the exercise of the powers conferred by this Regulation.

(4) The Minister may, notwithstanding anything contained in a licence issued to a licensee under the Wireless Telegraphy Regulations, 1916, by order published in the *Gazette*, prohibit for such time as he directs any licensee from communicating with any radiotelegraph station licensed by, or belonging to, or in any country which is at war with His Majesty the King or the possessions thereof.

(5) Any order under sub-regulation (4) of this Regulation may prohibit all communications whatever or may prohibit communications to particular stations or under special circumstances.

19. Operators' Proficiency Certificates.—(1) Every ship station in respect of which a licence is issued must be operated by a person or persons holding a certificate of competency or certificates of competency issued by the Naval Board after examination, or by the Postmaster-General of the United Kingdom, or by the proper authority in any part of the British Empire.

(2) Certificates of competency shall only be issued to natural-born British subjects, and shall be of two classes, namely:—

- (a) 1st class—issued to persons over 18 years of age capable of receiving and transmitting by sound at a speed which must not be less than 20 words per minute; and
- (b) 2nd class—issued to persons over 18 years of age capable of receiving and transmitting by sound at a speed which must not be less than 12 words per minute.

(3) A fee of ten shillings shall be paid by the candidate on each occasion on which such candidate is examined. A certificate of competency may be issued at a charge of five shillings to each candidate

who satisfactorily passes the prescribed examination, and in the event of a certificate being lost a fee of ten shillings shall be paid for the first copy of such certificate, one pound for the second copy, and two pounds for any subsequent copies. In case of failure a candidate shall not be re-examined in any system or under any circumstances until after the lapse of three months.

20. Use of Wireless Telegraphy for Military Purposes.—These Regulations shall not prevent the use, without licence, by the military authorities of wireless telegraphy for military purposes. Provided that each wireless telegraphy installation (other than a mere temporary installation) to be used shall be authorised in writing by the Naval Board.

21. Charges.—The total charges for messages transmitted and received for any duly authorised Wireless Station within the Commonwealth or licensed under the *Wireless Telegraphy Act, 1905-1915*, shall include :—

- (a) the coast charge which belongs to the coast station;
- (b) the ship charge which belongs to the ship station;
- (c) the charge for transmission over the lines of the telegraph system (where necessary); and
- (d) delivery charges (where necessary).

22. Rates.—The rates for messages transmitted to or received from ship stations shall be as follows :—

- (1) For ordinary messages—
 - (a) Coast station transmitting or receiving charge—
 - (i) Radiotelegrams to or from ships licensed in Australia or New Zealand, 3d. per word;
 - (ii) Radiotelegrams to or from other ships, 6d. per word.
 - (b) Ship station transmitting or receiving charge—
 - (i) Radiotelegrams to or from ships licensed in Australia or New Zealand, 2d. per word;
 - (ii) Radiotelegrams to or from other ships, not exceeding 4d. per word.
 - (c) Land line charge, 1d. per word.
- (2) For press messages—
 - (a) Coast station transmitting or receiving charge—
 - 1½d. per word.
 - (b) Ship station transmitting or receiving charge—
 - Not exceeding 4d. per word, as determined by the ship authorities concerned;
 - (c) Land line charge, ½d. per word, odd fractions of one penny to be reckoned as one penny.
- (3) For messages to or from ships of the British or Australian Navies—
 - (a) For official messages—
 - (i) There shall be no coast station charge.
 - (ii) There shall be no ship station charge.
 - (iii) Land line charge, 1d. per word.
 - (b) For private messages—
 - The rates and conditions shown in sub-Regulation (1) of this Regulation shall apply.

(4) For messages consisting of reports to Lloyd's agents concerning marine casualties and overdue vessels:—

(a) Coast station charge, 6d. per word.

(b) Land line charge, 1d. per word.

The charges for these messages shall be collected from the addressee.

(5) The charge for relaying radiotelegrams, irrespective of the number of coast stations concerned in the relaying, shall be:—

(a) When the ships of origin and of destination are both licensed in Australia or New Zealand, 4d. per word;

(b) When only one of the ships concerned or when neither of the ships concerned is licensed in Australia or New Zealand, 7d. per word.

23. (1) The rates for messages exchanged between stations established on the Australian mainland or in Tasmania and stations established on islands within the Commonwealth Administration or between any stations established on such islands, except Flinders Island and King Island, shall be—

(a) For ordinary messages one penny per word per radio station involved, plus ordinary land line charges for telegrams within the Commonwealth.

(b) For press messages—

	s.	d.	
Not exceeding 25 words ...	1	3	per station involved.
Exceeding 25, but not exceeding 50 ...	2	6	„ „ „
Exceeding 50, but not exceeding 100 ...	5	0	„ „ „
Every additional 50 words or portion of 50 words ...	2	6	„ „ „
plus ordinary land line charges for press telegrams within the Commonwealth.			

(2) The rates for messages exchanged between stations established on the Australian mainland or in Tasmania and stations established on King and Flinders Islands shall be—

(a) For ordinary messages one halfpenny per word per radio station involved, with a minimum of one shilling per message, plus ordinary land line charges for telegrams within the Commonwealth;

(b) For press messages—

	s.	d.	
Not exceeding 25 words ...	0	7½	per station involved.
Exceeding 25 but not exceeding 50 words ...	1	3	„ „ „
Exceeding 50 but not exceeding 100 words ...	2	6	„ „ „
Every additional 50 words or portion of 50 words ...	1	3	„ „ „
plus ordinary land line charges for press telegrams within the Commonwealth.			

(3) For messages exchanged between stations established on the Australian mainland or in Tasmania at times when the local telegraph offices are closed, the rates shall be 3d. per word plus the ordinary land line charges for telegrams within the Commonwealth, for such land line handling as is involved.

(4) For press messages exchanged between stations established on the Australian mainland or in Tasmania at times when the local telegraph offices are closed, the rates shall be 1d. per word plus the ordinary land line charges for press telegrams within the Commonwealth, for such land line handling as is involved.

(5) The rates for the radiotelegraphic transmission of deferred and week-end telegrams shall be one-half and one-quarter of the ordinary rates respectively.

(6) Delivery charges, if any, shall in all cases be paid by the addressee.

24. (1) Radiotelegrams conveying Christmas or New Year greetings may be lodged at any telegraph office in the Commonwealth for transmission to New Zealand or to vessels registered in Australia or New Zealand. In addition to the address and signature, such radiotelegrams may contain a text consisting of any one of the following phrases:—

- (a) "Christmas greetings."
- (b) "New Year greetings."
- (c) "Compliments of the season."

(2) The total charge for such radiotelegrams shall be:—

- (a) For those addressed to New Zealand, 4s.
- (b) For those addressed to vessels registered in Australia or New Zealand, 3s.

(3) Radiotelegrams containing the text "Christmas greetings" must be lodged on or before 23rd December, and those containing the text "New Year's greetings" or "Compliments of the season" must be lodged on or before 28th December.

25. The total charge for messages transmitted to or from ships shall be paid by the sender.

26. *Press Radiotelegrams for Publication on Ships.*—(1) Press radiotelegrams for publication on ships shall be addressed to the commander of a ship, or to a newspaper published on board a ship, and shall bear in the address the words "for publication," which words shall be charged for at press rates.

(2) The information contained in such press radiotelegrams must either be published in a ship's newspaper or posted on a ship's public notice board.

(3) Press radiotelegrams shall, subject to this Regulation, comply with the provisions of Articles 65 and 66 of the detailed Regulations attached to the International Telegraph Convention.

27. *Refunds.*—The full charge for a radiotelegram will be refunded when such radiotelegram is rendered useless through a fault of the telegraph service, and the full charge, less land-line charges, will be refunded when a radiotelegram cannot be delivered on account of the ship of destination having passed out of range.

28. *Transmission of Shipping Intelligence by Telephone.*—Information received at a coast station from vessels at sea, indicating the noon or midnight position, will be communicated by telephone to the owners or agents of such vessels on payment of one shilling per communication.

29. *Ocean Forecasts and Weather Reports.*—Ocean forecasts sent by the Commonwealth Meteorologist will be transmitted from radiotelegraph stations owned, operated, and maintained by or on behalf of the Minister to vessels at sea, and weather reports received at such radiotelegraph stations from vessels at sea, and addressed to the Commonwealth Meteorologist, will be transmitted, on payment of the following charges:—

For each communication not exceeding 20 words, 2s.; for each additional word, 1d.; plus one penny per word land line charge.

30. *Repeal.*—All Regulations previously made under the *Wireless Telegraphy Act 1905-1915*, and in force at the commencement of these Regulations, are hereby repealed save as to any right, privilege, or obligation acquired, accrued, or incurred thereunder.

C The form of licence set out in the schedule to the above regulations is similar to that employed by the British Post Office. (See Great Britain, page 360.)

Navigation Act

D THE Commonwealth Parliament passed in 1912 a Navigation Act which contains a clause making it compulsory for ships trading in Australian waters to be equipped with apparatus for wireless telegraphy. This matter is dealt with in Section 231 of the Act, and the text of the section given below is as under:—

EXTRACT FROM NEW NAVIGATION ACT, 1912.

DIVISION VI.

231. (1) Except as prescribed, every foreign-going ship, Australian trade ship, or ship engaged in the coasting trade, carrying fifty or more persons, including passengers and crew, shall before going to sea from any port in Australia be equipped with an efficient apparatus for wireless communication in good working order in charge of one or more persons holding prescribed certificates of skill in the use of such apparatus.

(2) For the purposes of this section apparatus for wireless communication shall not be deemed to be efficient unless:—

- (a) It is capable of transmitting and receiving messages over a distance of at least one hundred miles, day and night.
- (b) The person controlling the operator undertakes in writing to the Minister to exchange, and does, in fact, exchange, as far as may be physically practicable (of which the master shall be the judge) messages with shore or ship stations using similar or other systems of wireless communication; and

(c) There is provided, in connection with the apparatus, and ready for use whenever from any cause the ordinary supply of electrical power is not available, a battery of accumulators of such capacity as to insure for a period of at least six hours communication of the efficiency prescribed in paragraph (a) of this sub-section.

(3) The equipment shall, if so prescribed, include a silent chamber for the receipt of messages.

(4) The master of a ship required by this section or the regulations to be equipped with wireless telegraphy apparatus shall not take her to sea, and the owner of a ship required to be so equipped shall not permit her to go to sea, unless the requirements of this section have been complied with.

PENALTY: One Thousand Pounds.

(5) The regulations may prescribe the times and hours during which an operator shall be in attendance on the apparatus, ready to receive or transmit messages.

(6) Except as otherwise prescribed, the provisions of this section shall not apply to ships plying exclusively between ports in Australia less than two hundred miles apart.

(7) The Governor-General may make regulations in accordance with the provisions of any International Convention to which the United Kingdom is a party relating to the use of Wireless Telegraphy on ships, and such regulations may be in addition to, or in substitution either wholly or in part for the provisions of this section.

AUSTRIA

The "Austro-Hungarian Monarchy" (as the combination of the Empire of Austria with the Kingdom of Hungary is officially designated) being at war with Great Britain and her Allies, it is only possible to print here the Laws and Regulations as ruling before the declaration of hostilities.

A—Decree of Ministry of Commerce, 7th January, 1910.

B—Document of Concession.

C—Decree of Ministry of Commerce, 8th November, 1910.

D—Special Regulation, Ministry of Commerce, 1st March, 1912.

E—Regulations (Ship Stations), 1st April, 1912.

F—Temporary Service Regulations—Operators.

A **T**HE following Decree of the Ministry of Commerce, dated 7th January, 1910, is concerned with wireless telegraph stations in the Austrian Empire, on board Austrian ships, and on ships of foreign nationality in Austrian territorial waters:—

(1) In accordance with a High Decree of Parliament of January 16th, 1847, and the Decree of the Ministry of Commerce, dated April 28th, 1905, the erection and working of Wireless Telegraph stations in the Austrian Empire and on Austrian ships is a State

concession, to acquire which a written application (liable to Stamp Duty), containing a description of the station and a diagram of connections, must be submitted.

(2) The choice of system, apparatus, and fixtures, as well as the establishment of coast and land rates within the limits of the Wireless Telegraph agreement of 1909, and the supplemental regulations are the prerogative of the Ministry of Commerce.

(3) The general regulations for Wireless Telegraph stations on board ships are shown below.

(4) Wireless Telegraph stations on board ships must fulfil the following conditions:—

(a) They must be of equal technical efficiency to systems other than that adopted in the stations, and they must be able to inter-communicate with other systems.

(b) The system adopted must be one of "syntonisation."

(c) The speed of transmission and reception must not, under normal circumstances, be less than twelve words (each of five letters) per minute.

(d) The power possessed by the apparatus must not exceed, in normal conditions, 1 kilowatt. A greater power can be used when the ship is under an obligation to exchange messages at a longer distance than 300 kilometres from the nearest coast station, or when the transmission can only be effected by means of a higher power than specified.

(5) The working of Wireless Telegraph stations on board foreign ships in Austrian territorial waters is dependent upon the previous grant of a State concession. This regulation does not apply to war-ships or ships in distress. If a foreign vessel employs its Wireless Telegraph station without authorisation, the State authorities may take steps to prevent the working of the station in Austrian territorial waters.

DOCUMENT OF CONCESSION.

B THE Ministry of Commerce hereby grants to the concession for the installation and working of a wireless telegraph ship station on board the s.s. and reserves to itself the right to cancel same at any time. The concession is granted on the following conditions:—

(1) The Wireless Telegraph station must be erected according to the description in the application and according to the diagram of connections.

Supplemental changes in the technical installation which would have an effect upon the transmitting and receiving speed of the station cannot be undertaken without the consent of the Ministry of Commerce.

(2) The concessionnaire must pay an annual recognition fee of 20 Kronen for the station.

(3) The Telegraph Directorate is entitled to empower their officials to examine the station and to control the working of the same.

Opportunity must be given to officials of the Austrian Navy, on their request, to make themselves acquainted with the working of the station apparatus.

Collusion in order to keep back details of the condition of the station from the official authorities is inadmissible.

(4) The Telegraph Directorate reserves to itself the right of using the station at any time, completely and absolutely, or for a definite kind of correspondence, and this they may do without giving their reasons, or without the concessionnaire being able to claim any indemnity.

(5) In case of war and mobilisation the station must be closed. The commander of the ship must superintend the closing and make himself responsible for it.

The control over the supervision of this measure is confined to the military authorities.

(6) Only Austrian subjects can be employed as telegraph operators, and they must be able to show a testimonial to the effect that they have successfully passed the special examination of the Telegraph Directorate.

Wireless telegraph operators on board ship must be provided with a sea service book, they must be enrolled in the muster, and must be subject to the ship's discipline.

In case of the cancelling of the above-mentioned testimonial by the State Telegraph Directorate, a telegraph operator must be dismissed immediately.

Every change of operator must without delay be notified to the marine authorities in Trieste.

(7) The concessionnaire must allow to third persons the services of the station on payment by them of the normal charges.

(8) The station charge amounts to . . . a word. The lowest telegram amounts to . . . Kronen. The charge belongs to the under-writer.

(9) The station must exchange news with all coast stations, and with all other ship stations without prejudice as to the system of wireless telegraphy used by these stations.

(10) As regards the working of the station and the scale of the tariff, the regulations of the International Radio Telegraph Convention and its supplemental regulations must be observed, in the same manner as all measures published by the Telegraph Directorate.

The call signal of the station is established as

C THE following is a copy of the Decree of the Minister of Commerce of November 8th, 1910, concerning the installation of wireless stations on passenger ships engaged in the carrying service abroad:—

Austrian vessels of the merchant service making voyages from Austrian ports and carrying passengers beyond Gibraltar or Aden must be fitted with wireless telegraph apparatus.

With regard to the fitting, working, and staff of such wireless stations, the conditions of the Decree of the Ministry of Commerce dated January 7th, 1910, must be complied with. Such stations must be capable of exchanging telegrams at a distance of 100 nautical miles, and above all must be of use, at the request of the Captain, for rescue purposes and for the safety of the vessel by communication with coast stations or with the stations of other ships without distinction of system.

The Royal Imperial Masters of Ports as well as Consuls are authorised to forbid the carrying of passengers on any ships passing beyond Gibraltar and (or) Aden not so fitted.

This decree will come into force one year after notice of same has been published.

D THE following Regulation of the Ministry of Commerce, dated March 1st, 1912, concerns the erection of a wireless telegraphy inspectorate in Trieste, and the erection and regulation of wireless telegraphy offices on Austrian vessels.

(1) In accordance with the High Decree of 15th February, 1912, a Royal Wireless Telegraphy Inspectorate has been created, which is immediately subordinate to the Ministry of Commerce. On and after April, 1912, this department shall control the Wireless Telegraph offices on board Austrian ships, private Wireless Telegraph offices on Austrian ships and foreign ships in Austrian territorial waters.

REGULATIONS.

E THE following normal Regulations governing the installation and working of wireless telegraph offices on board Austrian ships came into force on April 1st, 1912 :—

(1) Wireless Telegraph offices on board ships under the State direction shall carry the sign "Kk Bordtelegraphamt" (Royal Telegraphy Office on Board Ship), together with the name of the vessel.

(2) The owner of a vessel who requires a Wireless Telegraph office must apply to the Ministry of Commerce, and must give the following particulars :—

(a) The name of the ship and the time and date when the installation is required to be erected.

(b) The routes on which the ship will be principally engaged.

(c) The accommodation for first and second-class passengers on board.

(3) The Ministry of Commerce must, within a period of two months, inform any applicant for a Wireless Telegraph installation on board ship whether such an installation will be granted, and, if so, upon what terms.

Provided the vessel on which it is proposed to instal a Wireless Telegraph office comes within the scope of the Decree of the Ministry of Commerce, dated November, 1910 (concerning the equipment for Wireless Telegraphy of long-voyage passenger ships) the Ministry of Commerce must grant any application made in accordance with these regulations.

In cases where the Ministry declines to grant an installation, it is not called upon to state any reasons for its refusal. A written agreement is in all cases drawn up between the State Department and the owner of the vessel when an installation is granted.

In the event of any change in the regulations, a new agreement must be made.

(4) The Wireless Telegraph office shall be installed as near as possible to the date required by the shipowner, provided the application sent has duly satisfied the conditions laid down in Regulation 2. The period during which the installation is granted is usually six months.

The State department shall bear the entire cost of the fitting and furnishing of the Wireless Telegraph office, which is to remain the property of the State. The department shall undertake to maintain the office in a state of efficiency and to supervise the working of the installation through its own servants.

(5) The shipowner shall be responsible for the cost of all arrangements on board, services of the ship's *personnel*, materials and plant necessary for the proper installation and working of the Wireless Telegraph office, as well as the necessary electric power.

The shipowner's obligations with regard to these arrangements are set forth in detail in the written agreement referred to in Regulation 3.

The shipowner shall be required to provide adequate facilities for the telegraphists on board, to enable them to carry out their duties in an efficient manner; and the telegraphists must be made acquainted with the course and speed of the ship, soundings, and distances from foreign stations, as well as meteorological data.

6. The shipowner must pay the salaries due to the telegraphists for each voyage, which amounts thus paid will be refunded by the State, who will inform the owner, before the departure of the vessel, the amount of salary due to the telegraphists and the dates when the salaries become due.

The owner of the ship must make suitable provision for the safety of the telegraphists on board.

The owner must, at his own cost, carry out the following duties :—

(a) Carry telegraphists of the Royal Austrian Navy between Pola and Trieste when ordered to transfer them to or from the Wireless Telegraph Inspectorate at Trieste.

(b) Transfer the ship's telegraphists between the port and the ship which is being equipped with a Wireless Telegraph office, or between two ships, and provide for the maintenance of the telegraphists during the transfer.

(c) First-class travelling expenses and maintenance of the chief officials of the Royal Telegraph Department shall be provided when the officers are proceeding to take up their duties. Second-class travelling expenses shall be provided for officers of lower rank.

(7) The shipowner must contribute to the State Department an annual sum for the cost of the Wireless Telegraph office on board. In the case of ships which come under the decree of the Ministry of

Commerce dated November, 1910, the amount which the shipowner must contribute is from Kr. 2,200 to 2,500, the amount depending upon whether the apparatus is of the first or second-class type. The Ministry of Commerce will decide under which class the apparatus comes. The annual amount is payable in advance, in instalments, which become due on the first day of the months January, April, July, and October. The liability of the owner of the vessel becomes due on the date when the Wireless Telegraph office on board commences operations, and ceases on the date of the closing of the office; but in any case not before the expiration of the term of notice.

If the ship should be lost, the obligation to contribute ceases on the date of the loss, and when this is not known, the obligation is dated from the last date on which the ship was heard.

When a vessel has received through its Wireless Telegraph office distress messages from other ships, and has thus saved or helped to save another ship, the owner must pay to the State Department 3 per cent. of the net sum received by him for salvage.

(8) Service messages to and from the owner of the ship are dealt with at ordinary rates; "shipowner telegrams" which are wireless telegrams transmitted by the captain of the ship to the owner, or to the managing officials or agents, and which deal with the crew, passengers, cargo condition, voyage, conduct, or damage of the ship, are not transmitted in the interests of a third person.

"Ship Service Telegrams" are wireless telegrams exchanged by the captains of ships under the same ownership. Both classes of telegrams must be composed by the senders, and code words must be used as far as possible. A copy of the code must be deposited on board ships that have to transmit shipowner and ship service telegrams, and likewise in the office of the department. Such telegrams must be written by the sender on a form having a detachable receipt coupon provided for the purpose. They are only transmitted when the receipt coupon has been impressed with the ship's stamp, and this stamp must agree with the stamp which is deposited by the commander of the vessel in the wireless telegraph office on board.

(9) The coast and land charges for shipowner telegrams are deferred and are fixed on the basis of the receipt coupon in the wireless office on board. These charges must be checked immediately after the arrival of the ship in her own port against the amount of the receipt in the wireless telegraph office on board.

The charges for private telegrams may be collected in cash by the officer in charge of the wireless telegraph office, at the time of the despatch of the telegram, or they may be placed to credit.

(10) Telegraph operators on board are subject to the general discipline of the ship, and to the instructions of the captain or his representatives. They must not, however, be called upon to participate in any of the ordinary business of the ship.

Free access to the premises of the telegraph office is allowed to the captain or to his representatives. Other members of the crew may have access to these premises only for the purpose of executing the duties mentioned in Regulation 5

A member of the crew must be sufficiently competent to take the place of the operator in case of necessity, and before the beginning of the voyage the person so appointed must be sworn to secrecy in the usual way.

(11) The State shall provide a Wireless Telegraph office on board ship when it deems it necessary for a definite or indefinite period, and in this case the owner has no claim to indemnity.

In the case of mobilisation or war the embargo on the Wireless Telegraph office of a ship can be ordered by the Royal Austrian Navy or by a Royal Austrian Consulate.

The captain of a ship is responsible for the closing of a telegraph office when such an order proceeds from the authorities mentioned.

(12) The State may at any time create a Wireless Telegraph office on a ship not limited to the decree referred to in Regulation 3. The owner of the ship must receive not less than six months' notice of the intention to create such an office; but, where circumstances warrant it, this period of notice shall not be observed.

The owner must give six months' notice in writing of his intention to terminate the agreement referred to in Regulation 3, and in the case of the sale of the ship three months' notice.

After the expiration of the notice the Wireless Telegraph office will be dismantled (except in the case of the ship sold abroad), but the dismantling shall take place only when the ship is in an Austrian port.

In the event of the dismantling of the office taking place in a port other than that of Trieste, the shipowner must pay for the technical dismantling and material belonging to the State, and he must despatch the apparatus to Trieste at his own cost, and pay the fares of the telegraph operators to the last-named port.

Temporary Service Regulations for Wireless Telegraphists.

A.—GENERAL.

F 1. In the Wireless Telegraph service of the Government Post and Telegraph Organisation, and, outside the Royal Naval Reserve, State employees under the title of "Funkentelegraphisten" (wireless telegraphists) will be employed.

The appointment of wireless operators will only take place in case of a lack of Royal Naval Reserves.

The conditions of service of wireless operators is subject to the following regulations, which, however, do not in any way affect discipline on board ship either of Captains, Port Officials, or Consuls.

B.—APPOINTMENT.

The conditions for the appointment of wireless operators are as under:—

1. Proof of Austrian citizenship.
2. Freedom from any conviction in a criminal court.
3. Age limit, between 18 and 40 years.
4. Proof of bodily fitness and general capability for the service.
5. Proofs of the necessary knowledge of languages for the special conditions of service.

6. Proof of capability to obtain a ship's telegraphist's certificate in case one year has expired since the issue of the certificate held by the applicant or since the last practical work done by him. The applicant has to prove that he has sufficient practice to enable him to carry on the service in an appropriate manner.

7. Applicants under age must present proof of permission to enter the service from parents or those responsible for them.

The following are excluded from appointment :—

1. Those who, through conviction in a criminal court have lost the right to enter the State service providing they have not regained same.

2. Those who have been bankrupts or who are trustees or guardians.

3. Those who have been employed by the State, and through some fault of their own have been dismissed therefrom.

Should a person who according to these regulations is excluded from appointment by any chance be appointed without the approval of the Minister of Commerce, he shall be considered as no longer belonging to the Service from the time that his undesirability for the Service is proved, and at once be dismissed therefrom without further ado.

4. Appointment is made by the Wireless Telegraph Department in Trieste by means of Service contract and either :—

(a) by notice, or

(b) for a certain voyage.

For appointment for a voyage only temporary use of the services of an operator as far as can be foreseen would be made, and State officials do not undertake any responsibility for the disadvantages which may be caused to an operator through the prolongation of the duration of a voyage of any ship on which he may be engaged.

When appointments are being considered, those persons who have requested the Inspectors' Department of the Service to put them in special or certain positions will first be taken into account.

The Service contract will be made in duplicate, one copy being handed to the employee against receipt for same, the other one being kept by the officials of the Department.

5. Wireless operators will be sworn in by the officials of the Wireless Department. The form of oath will be the one prescribed for other State officials.

C.—RIGHTS AND DUTIES.

6. For appointments subject to notice salary will be paid monthly. The monthly salary is due from the first to the last day of service inclusive.

Whether the salary commences or ends during the course of a calendar month, only the aliquot part will be paid, and 30 days will be reckoned as being one month.

7. For appointments for voyages salary will be paid by the day. The daily salary is due from the first to the last day of service inclusive.

In case a telegraphist who was appointed for a voyage should enter upon duty where he is subject to notice, he is entitled to any money outstanding under the conditions of the previous terms of appointment.

8. The payment of salary as mentioned in Par. 6 and 7 will take place on the last day of each month, but should an operator leave the service on a day other than the last of the month, he will be paid when he leaves. During a voyage the payment of salary will be made by the paymaster of the shipowners.

For voyages beyond the Mediterranean and Black Seas only one-half of the salary will be paid during the voyage, the other half being paid by the Wireless Telegraph Dept. at the end of the voyage.

9. Beside the regulation pay as per Par. 6 and 7, the wireless operator has a right to the following :—

(1) The benefits conferred by the Regulations of the Board of Trade of March 1st, 1912, R.G.Bl. No. 43 from the shipowners, and especially for sustenance and attention on board.

(2) A share in the profits of telegrams transmitted as per the special rules.

Telegraphists appointed subject to notice are further allowed : —

(a) For the period when not on board they receive an extra allowance of kronen 2 per day.

(b) For proofs of a mastery of a foreign language or languages, kronen 5 per month for each foreign language.

10. Operators may wear uniform whether on or off duty, but the wearing of any other uniform than that described in Supplement 5 is not permitted. Operators must use or allow to be used the wireless installations under their care *only* for the benefit of the State, and are moreover to continually bear in mind the safety of the ship.

Before going aboard, wireless operators must see that they have a sea Service Book in their possession.

E.—CANCELLATION OF THE SERVICE CONTRACT.

19. The Service Contract of operators appointed on notice may be cancelled :—

(1) By a six months' notice from either party.

(2) By the obligation to enter the military service as prescribed by the law for the duration of the said military service.

(3) By dismissal.

20. The Service Contract of operators appointed for voyages may be cancelled :—

(1) After the expiry of three days from the date of return from a voyage.

(2) By dismissal.

21. Except when a telegraphist has been dismissed from the Service, he has the right to a reference covering the period of his service.

F.—STAFF RECORDS.

22. At the Inspectors' Office of the Wireless Telegraph Department complete data regarding each wireless operator will be kept. The operator is bound to give any particulars by document or otherwise, and also to report any changes necessary in the said data.

BAHAMAS

(See WEST INDIES (BRITISH), page 534).

BARBADOS

(See WEST INDIES (BRITISH), page 539.)

BASUTOLAND

(See also South Africa, Union of)

BASUTOLAND, an inland native territory of South Africa lying between $28^{\circ} 45'$ and $30^{\circ} 40'$ S. latitude, and a longitude of $27^{\circ} 0'$ and $29^{\circ} 30'$ E., is governed by a Resident Commissioner under the direction of the High Commissioner for South Africa and located at Maseru, its principal town. The latter high official possesses legislative authority which is exercised by proclamation. Telegraph offices have been opened at Leribe, Maseru, Teyateyaneng, Morija, Mafeteng, Mohale's Hoek, and Quthing. The "Territory" covers an area of 11,716 square miles, and has been directly under the authority of the Crown since 1884; it forms an irregular parallelogram on the north-east of the Cape of Good Hope Province, and the seven districts into which it is divided bear the reputation of including the finest agricultural and pastoral land in South Africa.

In 1904 a proclamation was issued making provision for the working of wireless telegraphy within the territory, which we print below; but no application has up to the present been made for the establishment of any such installation.

PROCLAMATION.**No. 5 of 1904.**

By His Excellency the High Commissioner for South Africa.

Whereas it is expedient to make provision for the working of wireless telegraphy within the territory of Basutoland;

Now therefore by virtue of the powers in me vested I do hereby proclaim, declare and make known as follows;

1. No person shall establish or use any apparatus or installation for the transmission of messages or other communications by means of electrical energy without the aid of wires without having previously obtained a licence as hereinafter provided.

2. (1) It shall be lawful for the Resident Commissioner to authorise the issue of a licence for either of the purposes mentioned in section 1 and to revoke the same at any time, and there shall be payable in respect of such licence the sum of one hundred pounds.

(2) Every such licence shall be deemed to be granted upon such terms and conditions as the High Commissioner may from time to time prescribe by notice in the *Gazette*.

3. Any person who shall establish or use or attempt to establish or use any such apparatus or installation as is mentioned in section 1 in contravention of the provisions of this Proclamation shall be liable upon conviction to a penalty not exceeding two hundred and fifty pounds and in default of payment to imprisonment with or without hard labour for a period not exceeding three months and in case of a second or subsequent conviction to a penalty not exceeding five hundred pounds or in default of payment to imprisonment with or without hard labour for a period not exceeding six months.

4. This Proclamation shall take effect from the date of its publication in the *Gazette*.

GOD SAVE THE KING.

Given under my Hand and Seal at Johannesburg this twenty-fourth day of February One Thousand Nine Hundred and Four.

MILNER,

High Commissioner.

BELGIUM

BELGIUM, after being joined with Holland from 1815, formed itself into an independent State in 1830, under Prince Leopold of Saxe-Coburg, who ascended the throne on July 21st, 1831. According to the constitution of that date Belgium is "a Constitutional Representative and Hereditary Monarchy," the legislative power being vested in the King, the Senate and the Chamber of Representatives. The present King Albert, born on April 8th, 1875, succeeded his uncle on December 17th, 1909.

The total area of the kingdom is estimated at 11,373 square miles, and is divided into nine provinces, the capital city being Brussels.

The administration of wireless telegraphy in Belgium is regulated by the Royal Decree of November 3rd, 1913, which we reprint below.

DECREE DATED NOVEMBER 3RD, 1913.

In virtue of the law of March 6th, 1818, relating to the penalties to be imposed for contraventions of the administrative regulations in the interior, as also to those which might be called into force by the by-laws of provincial and communal authorities, on the suggestion of our Minister of Marine, Posts, and Telegraphs, we do and hereby decree :—

1. On Belgian territory and on Belgian ships every kind of electrical radiating apparatus or installation capable of being used for or interfering with either the transmission or the reception of radiotelegraphic or radiotelephonic signals, as well as every projected removal of or

modification to, or in the arrangement of an authorised installation, must be submitted to the Marine Department previous to any steps being taken which may be considered as a commencement of such a project.

The applicant for a licence must indicate the nature of the installation, the object of its exploitation as regards ship stations, the tariff of taxes which it is intended to charge, the details of the apparatus and methods to be employed, the wave-length, the hours of working, and generally all information of such a nature as will permit of a complete study of the project ; it must further state what measures are proposed in order to prevent disturbance in the service of other stations, either official or authorised.

2. The granting of a licence is subject to the reserve and conditions which are considered necessary in the interest of the public safety and convenience, this also including the safeguard of the public and service correspondence.

3. A new licence becomes necessary :—

(a) If the station has not been installed or modified and put into service within the time specified in the licence.

(b) If the station has been put into action or exploited in conditions other than those stipulated therein.

4. This regulation applies to all installations which were in existence prior to the Act being put into force, and the owners of such installations must forthwith apply for a licence, as prescribed in Article 1 of this Act, and in the meantime they must suspend the operation of such stations until the granting of a licence.

5. Vessels registered in foreign nations, fitted with wireless telegraph apparatus previous to their entry into Belgian waters, shall not be subjected to the previous dispositions, but they must procure a permit from the Belgian Minister to enable them to operate. Neither do the foregoing dispositions prevent distress signals being sent or received from other ships.

Foreign vessels are required, on entering Belgian waters, to cease all operations which might interfere with radiotelegraphic or radio-telephonic stations in Belgium.

6. On Belgian territory and in Belgian waters, as well as on board Belgian vessels to be found in foreign waters or harbours, the duly sworn delegates of the Government (according to Article 8 of the law of July 10th, 1908) have, at all times of the day or night, free access to the lands, buildings, ships or other craft, where licensed installations are working or for which a regular certificate of authorisation has been granted. The proprietors, exploiters, owners, commanders, directors, managers, chiefs, or employees of any description are bound to facilitate by all means in their power to help such delegates in the carrying out of their duties of examining such stations.

7. Proprietors, exploiters, and owners are responsible under civil law for the fines imposed on their commanders, directors, managers, chiefs, or employees.

8. The Minister of Marine, Posts, and Telegraphs is charged with the execution of the present law.

9. The present law will come into force the day following the date of publication (November 4th, 1913).

BERMUDA

(See WEST INDIES (BRITISH), page 532.)

BOLIVIA (REPUBLIC OF)

THIS State possesses no seaboard, and, therefore, no Maritime Stations. The total area of the Republic is reckoned at 703,421 square miles. Geographically it lies between latitude 8° and 23° S., its longitude extending from $57^{\circ} 30'$ to 73° W. The population is estimated at about two and a half millions; the railway mileage is 800 and that of telegraph wire 2,896 miles. Lake Titicaca, a wonderful stretch of water, about 150 miles in length and breadth and 12,545 feet above the level of the sea, marks the boundary between Bolivia and Peru, and still forms an important means of communication between the countries, although the most direct means of transit consists of the railway between Arica (Peru) and La Paz, the capital of Bolivia.

The Government consists of a President, two Vice-Presidents and five Ministers of State.

Wireless telegraphy forms at present a branch of the Posts and Telegraphs, which is administered by the State. The chief officials are :—

Mr. Rosendo Villalobos, Superintendent of Posts and Telegraphs, with office at La Paz.

Mr. Humberto Asin, Superintending Wireless Engineer, with office at La Paz.

Bolivia entered the International Telegraphic Convention on June 1st, 1907, in the fourth category, and gave in its adherence to the International Radiotelegraphic Convention on October 29th, 1915. It takes part in the upkeep of the International Radiotelegraphic Bureau, located at Berne (Switzerland), and the Series of Call Letters assigned to Bolivia by the Bureau are CPA.—Z.

The first Radiotelegraphic Station erected in Bolivia was at Ballivian (Chaco), opened on February 21st, 1914.

There are three working stations of 15 kw. possessing a range of 745 miles. These are :—

(a) The Viacha Station (opened October 20th, 1916), intended as the centre of international communication.

(b) Riberalta (erected October 1905), intended as the centre of internal communication, and

(c) Yacuiba (Caipitandi).

There are four other stations of 6 kw. and 75 miles range. These are situated in Yacuiba (Caipitandi), Ballivian (Chaco), D'Orbigny, and Esteros. Two further stations will be shortly erected at Cobiya and Trinidad of 5 kw. and 3 kw. respectively.

Radio communication with Peru is mainly carried out through the Bolivian Stations of Viacha and Riberalta, working through the Peruvian Station at Lima. Communication with the southern part of Brazil will be established as soon as stations have been erected at Puerto Suarez and Santa Cruz de la Sierra (Bolivia). The working of radiotelegraphic intercommunication with Brazil via Viacha—Riberalta—Porto Velho (Brazil) forms a subject for present negotiation. Satisfactory tests have also been made in wireless communication between Yacuiba (Caipitandi) and Asuncion (Paraguay). Indeed, Bolivia is looking forward in the future to establishing communication with all the neighbouring South American States through the means of wireless telegraphy.

A radiotelegraphic school was established during 1917 in La Paz, under the direction of Mr. Asin, the Superintendent of Radiotelegraphy. There are no wireless clubs or societies in the Republic.

At present no special laws or regulations have been passed for the administration of wireless, but a Bill for that purpose is in course of being drafted.

BORNEO (BRITISH)

PROTECTORATE OF SARAWAK.

THIS semi-independent State lies on the north-west coast of the island of Borneo. Its seaboard is 400 miles, its area 50,000 square miles. The romantic story of how the present hereditary dynasty was initiated under Raja Brooke in 1842 is too well known to need repetition. It is now a British Protectorate, the Civil Service being composed of British officials selected by the Raja.

The wireless department is in the sole charge of the Post Office, the Postmaster-General having been appointed "Manager" in August, 1916, and the stations having been opened for general use in April, 1917. There are no stations of any sort in Sarawak, except the land stations directly controlled by the Government, and, under present circumstances, it is not considered advisable to give details thereof.

The only two special officers are Mr. C. C. Robison, Manager of the Wireless Telegraph Department, and Mr. P. C. Heming, Acting Superintendent.

There are no regulations obliging ships trading in Sarawak waters to be fitted with wireless.

Sarawak is connected with the world-wide system of telegraphic communication by wireless through Singapore. There are three other wireless stations in the country at Sadony, Sibn, and Miri.

BRITISH NORTH BORNEO.

British North Borneo occupies the northern part of the Island of Borneo. The interior is mountainous, Mount Kinabalu being 13,455 feet high, but most of the surface is jungle.

Total area is about 31,106 square miles, with a coast line of over 900 miles.

The territory is under the jurisdiction of the British North Borneo Company, being held under grants from the Sultans of Brunei and Sulu (Royal Charter in 1881). The territory is administered by a Governor (appointed with the approval of the Secretary of State) in Borneo and a Court of Directors in London, appointed under the Charter. On May 12th, 1888, the British Government proclaimed a formal protectorate over the State of North Borneo.

Radiotelegraph intercommunication is maintained by four 5-kilowatt Government stations situated at Jesselton, Sandakan, Kudat and Tawau respectively. The Siemens Quenched Spark system is employed throughout. The Sandakan station was the first erected in the State and completed in October, 1913. The conditions of working are, as in most tropical countries, not altogether good, owing to the strong electrical disturbances and the mountainous country which is covered with dense jungle. The four stations have, however, maintained an uninterrupted day service since their erection.

PUBLIC DEPARTMENT CONTROLLING WIRELESS TELEGRAPH OPERATORS.

Chief Superintendent Telegraphs ; E. C. Roberts, Head of Radiotelegraph Department, Jesselton, B.N.B. ; D. A. Dabell, Operator-in-Charge, Sandakan ; A. D. G. Taylor, Operator-in-Charge, Jesselton.

WIRELESS TELEGRAPHY PROCLAMATION, 1914.

British North Borneo has been included as a party in the International Radiotelegraphic Convention.

The following proclamation controls the use of wireless telegraphy :—

1. This proclamation may be cited as " The Wireless Telegraphy Proclamation, 1914," and shall come into force upon the publication thereof in the *Gazette*.

2. (i.) In this proclamation the expression " wireless telegraphy " means any system of communication by telegraph as defined by " The Telegraph Proclamation, 1901," without the aid of any wire connecting the points from and at which the messages or other communications are sent and received ;

The expression " locally owned ship " means a ship owned wholly by the Government or by bodies corporate established under and subject to the laws of this State, and having their principal place of business within this State.

(ii.) Nothing in this proclamation shall prevent any person from making or using apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. The Governor may, whenever he shall deem it expedient to do so, license the establishment of any wireless telegraph station, or the installation or working of any apparatus for wireless telegraphy, in any place in this State or on board any locally owned ship.

4. (i.) No person shall establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place in this State or on board any locally owned ship except under and in accordance with a licence granted in that behalf by the Governor.

(ii.) Every such licence shall be in such form and for such periods as the Governor may determine, and shall contain such terms, conditions and restrictions on and subject to which the licence is granted as the Governor shall consider desirable in the public interest.

5. (i.) Any person establishing a wireless telegraph station without a licence in that behalf, or installing or working any apparatus for wireless telegraphy without a licence in that behalf, shall be liable to a fine not exceeding one thousand dollars or to imprisonment of either description for a term not exceeding twelve months, and in either case be liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence, provided that no proceedings shall be taken against any person under the proclamation except with the previous sanction of the Governor.

(ii.) On being satisfied by information on oath that there is reasonable ground for believing that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any ship within the jurisdiction without a licence in that behalf, a magistrate may grant a search warrant to any police officer to enter and inspect the station, place, or ship, and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

6. (i.) The Governor may make and, when made, vary or cancel rules more particularly for all or any of the following matters :—

- (a) For prescribing the form and manner in which applications for licences under the proclamation are to be made ;
- (b) For prescribing the fees payable on the grant of any licence ;
- (c) For regulating the manner in which apparatus for wireless telegraphy on board a merchant ship, whether a locally owned ship or a British or a foreign ship, in the waters of this State shall be worked so as to prevent the interference with naval signalling or the working of any wireless telegraph station lawfully established, installed, or worked in this State or the waters thereof, and so as not to interrupt or interfere with the transmission of any wireless messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea ;

- (d) For prohibiting, except with the special or general permission of the Superintendent of Telegraphs, the working or using of any apparatus for wireless telegraphy on board a merchant ship, whether a locally owned ship or a British or a foreign ship, whilst such ship is in any of the harbours of this State ;
- (e) For prohibiting or regulating, in case at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that the Government should have control over the transmission of messages by wireless telegraphy on board merchant ships, whether locally owned ships or British or foreign ships, in the waters of this State, the use of wireless telegraphy on board such ships while in such waters by such further rules as the Governor may see fit to make from time to time, either in all cases or in such cases as may be deemed desirable ;
- (f) And generally for the more effectual carrying out of the provisions of this proclamation.

(ii.) No rules made in respect of the matters described in paragraphs (c), (d), and (e) of sub-section (i.) shall apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

7. On an application for a licence proving to the satisfaction of the Governor that the whole object of obtaining the licence is to enable him to conduct experiments in wireless telegraphy, a licence for that purpose shall be granted to such applicant, subject to such special terms, conditions, and restrictions as the Governor may think proper that such licence shall not be subject to any rent or royalty.

8. (i.) Every omission or neglect to comply with, and every act done or attempted to be done contrary to, the provisions of the proclamation, or of any rule made thereunder, or in breach of the conditions and restrictions subject to or upon which any licence has been issued, shall be deemed to be an offence against, not otherwise specially provided for, the offender shall, in addition to the forfeiture of any articles seized, be liable to a fine not exceeding five hundred dollars.

(ii.) All convictions, forfeitures, and fines under this proclamation, or any rules made thereunder, may be had and recovered before the Court of a Magistrate or the First Class.

BRAZIL

THE great Republic of Brazil extends on both sides of the Equator. With regard to latitude it stretches between 4° 22' N. and 33° 45' S., whilst with regard to longitude it lies within the limit of 34° 40' and 73° 15' W. It covers an area estimated at 3,298,870 square miles, and abounds in natural wealth of every description. Originally a colony of " Britain's oldest ally," the most cordial relationship between Brazilians and British is traditional with both nations.

The radiotelegraphic stations of the country are exclusively under the control of the Government, and their administration is regulated by the Minister of Roads and Public Works with respect

to installations of a civil character, and by the Ministers of State for War and the Navy with respect to installations destined for national defence and the services of the military and naval forces.

PUBLIC DEPARTMENTS CONTROLLING WIRELESS TELEGRAPH OPERATIONS.

<i>Official.</i>	<i>Title.</i>	<i>Address.</i>
Dr. Augusto Tavares de Lyra.	Minister of Ways and Public Works.	Ministerio da Viacao e Obras Publicas, Rio.
Dr. Euclides Barroso	Director of Telegraphs...	Reparticao Geral dos Telegraphos.
Dr. Leopoldo Weiss	Vice-Director of Telegraphs.	Reparticao Geral dos Telegraphos.
Dr. Francisco Bhering	Sub-Director Technical	Reparticao Geral dos Telegraphos.
Admiral Alexandrino Faria de Alencar.	Minister of Marine	Ministerio da Marinha, Rio.
Capt. Moraes Rego	Head of Naval Radio-telegraphic Service.	Ministerio da Marinha, Rio.
Marshal José Caetano de Faria	Minister of War...	Ministerio da Guerra, Rio.
Not yet appointed)	Head of Army Radio-telegraphic Service.	This service is directed by an Officer of the 1st Battalion of Engineers.

There are no private, experimental or amateur wireless installations; all have been abolished by order of the Government. There are no wireless societies, clubs or publications. There are no privately owned land stations. Land stations directly controlled by the Government number over 25; there are 28 ship stations on Government vessels and 56 on privately owned vessels, all Marconi system. All installations on privately owned vessels are operated by the Marconi International Marine Communication Co., Ltd.

According to the latest information available, the following constitute the number of stations at present working:—

LAND STATIONS.

Eight installations open for the exchange of commercial traffic with ship stations, all operated and controlled by the Brazilian Government.

Twelve coast installations open for the exchange of Government traffic only.

Eight installations open for public correspondence in the Brazilian Inland Service.

The above list does not include stations in course of erection, or any which, although complete, may not have been put into actual working.

PRIVATE SHIP STATIONS.

Twenty-nine installations on the Lloyd Brasileiro.

Six installations on the Lloyd Nacional.

Seven installations on the Nav. Bahiana.

Twelve installations on the Naç. de Navegacao Costeira.

One installation on the Commercio e Navegacao.

One installation on the Hoepcke Carl, Jr.

GOVERNMENT SHIP STATIONS.

Twenty-eight naval stations.

Four Government transports, etc.

Owing to war conditions the ship and shore radiotelegraphic service is naturally somewhat restricted. The general regulations are governed by the laws and regulations of which the text is printed below, and it would appear that the Brazilian authorities continue (at the time of publication) to accept messages on shipping companies' business as well as passenger traffic, provided that the messages are written in plain language and that it be perfectly clear they have no other object than the private affairs of the companies and/or passengers.

The Fernando Noronha Station, situated on an island N.E. of Brazil, off in the Atlantic, $3^{\circ} 50'$ S. latitude and $32^{\circ} 25'$ W. longitude, is at present under the direction of the Minister of Marine, and all messages accepted for transmission through this station must be worded in plain language—Portuguese, English, French, Italian, or Spanish. They are subject to censorship by the Military Governor of the island.

We print below the following laws and regulations which govern the administration of wireless in the Republic :

A.—Extract from Act relating to the Brazilian Merchant Service.

B.—Extract from Law No. 2,719 of December 31st, 1912.

C.—Law 2,738 of January 4th, 1913.

D.—Decree 10,689 of January 14th, 1914.

E.—Regulation.

F.—Form of Licence.

G.—Decree No. 3,296 of July 10th, 1917.

H.—Extract from Decree No. 3,316 of August 16th, 1917.

It must be noted that "D.," although passed by Congress and signed by the President of the Republic, would not appear to have yet come into active operation in its entirety. It will be observed, for instance, that the Decree gives permissive power to the Government to allow Private Corporations and the Authorities of the States comprising the Republic to erect stations within certain limitations. The later Decree, lettered "E.," seems to contemplate the suspension of this power and possibly of some other provisions also.

A ACT RELATING TO THE MERCHANT SERVICE.

The following Articles refer to Wireless Telegraphy :

ART. 159.—Those boats must without exception be provided with radiotelegraphic apparatus, approved by the General Direction of Telegraphs, with the necessary power to allow of communication with the wireless stations in the zones in which they trade, when :

(a) they carry passengers and are employed in the coastal trade, of any description whatsoever, and having a registered tonnage of over 300 tons, and for those boats employed in river trade having a registered tonnage of over 500 tons.

(b) They are only employed in the coastal trade as cargo boats, but carry over 30 (thirty) souls all told.

ART. 160.—After the promulgation of this regulation, no ship shall be registered by any Port Authority if it has not complied with the regulations of the preceding Article, the licence to navigate being refused to any ship which, within one year from the date of the promulgation of this regulation, shall not have fulfilled the dispositions set forth herein.

LAW NO. 2,719.

DECEMBER 31ST, 1912.

B The above Law fixes the Coast Tax at 6 francs for a telegram up to 10 words, and 60 centimes for each extra word. Included in the rate is the transmission between a coast station and the telegraph stations to which the wireless station is directly joined up.

There is a land telegraph charge (via National lines) of 25 centimes a word without minimum on telegrams destined to telegraph stations which are not directly connected up with a coast station.

For telegrams exchanged between Brazilian coast stations and ships flying the Brazilian flag the ship tax has been fixed at 240 reis a word with a minimum of 10 words, the coast tax at 400 reis a word with a minimum of 10 words, and the land telegraph charge (if any) at 200 reis a word without a minimum.

LAW NO. 2,738.

JANUARY 4TH, 1913.

C A new wireless district was created by the above Law, with a credit of 732 contos, to include the Acre, Amazonas, and Para wireless stations, and these stations have since been taken over by the Telegraph Department and opened to public traffic.

DECREE NO. 10,689.

JANUARY 14TH, 1914.

D Approves the regulations governing the national wireless system.

The President of the republic of the United States of Brazil, using the authority granted to him by Section 1 of Art. 48 of the Constitution, hereby decrees :

Sole Article.—The regulations for the national wireless service revised by the combined Civil and Military Technical Committee issued together with the present decree, signed by the Ministers of State for the Affairs of Roads and Public Works and for the Affairs of the War and Marine, are hereby approved by virtue of Articles 18 and 19 of Law No. 2,050 of the 31st December, 1908.

Rio de Janeiro, 14th January, 1914, 93rd of Independence and 26th of the republic.

HERMES R. DA FONSECA.

José Barboza Gonçalves
Alexandrino Faria de Alencar.
Vespasiano Gonçalves de Albuquerque e Silva.

REGULATIONS.

FOR THE NATIONAL WIRELESS TELEGRAPHIC SERVICE REFERRED TO
IN DECREE NO. 10,689 OF THIS DATE.

(Revision of 1913.)

CHAPTER I.

E *Wireless telegraphic system and organisation of the respective stations.*

WIRELESS TELEGRAPHIC SYSTEM.

ART. 1.—The wireless telegraphic system shall consist of the fixed stations erected on the coast and on the islands and in the interior of the republic depending upon the Ministries of Roads and Public Works, of Marine and War and of mobile stations existing in ships navigating under the Brazilian flag.

ART. 2.—The fixed stations shall constitute five groups, to wit :

1. International service by land or oversea.
2. Ocean service.
3. River or fluvial service.
4. Frontier or border service.
5. Inter-State service.

Sole paragraph.—The wireless telegraphic and telephonic service over Brazilian territorial waters is under the exclusive control and supervision of the Federal Government.

ART. 3.—The mobile stations dependent upon the different departments of the administration interested in each shall constitute other groups intended for the purposes of the travelling service in general, and shall be formed according to the requirements of each department.

Sole paragraph.—Carts, aeroplanes and airships when fitted with wireless telegraphic and telephonic stations shall constitute the object of provisional instructions issued by the Combined Technical Committee in regard to their class.

ART. 4.—The States in the establishment or authorisation of the inter-State service shall have in view the provisions set forth in the Convention of Berlin, 1906, and maintained in the London Convention, 1912, as regards the obligation assumed by the Union that it would impose the fulfilment of the international provisions upon such private enterprises as might be authorised either to establish or to operate coastal wireless telegraphic stations open to the public service between the land and the ships at sea, or authorised to establish and operate wireless telegraphic stations open or not to the public correspondence on board any ships sailing under the flags of the said nations. This provision must therefore be complied with in the three cases of the carrying out of works which are defined by law as being under administration, by contract and by concession.

ART. 5.—The Federal Government reserves for itself, in a general manner, the inter-State service, in accordance with section 4 of Article 9 of the Federal Constitutional Law, and due to the fact that all the States and the Acre Territory are provided, without exception, with Federal telegraph services with or without wires.

Sole paragraph.—The communication between any points situated on inter-State border zones, whenever they shall not cause any losses whatsoever to the Federal Services, may be authorised by the States interested, with the approval of the Union previously granted by means of temporary permission without privilege, provided the development of the national telegraph system be protected.

ART. 6.—The fixed federal stations, besides the ordinary inter-communications, must attend to the mobile stations not only on any craft navigating on the rivers and the ocean, but also to those placed on carts and others intended for the service of the Army and for public works in general.

Sole paragraph.—Whenever the service of the fixed intra-State stations shall have to reach beyond the border of the States it shall be turned over to the Federal fixed stations specially such messages as may be intended for the fluvial correspondence.

ART. 7.—The fixed and moveable stations of the Ministries of War and Marine shall comply, as far as possible, with the same regulations governing the fixed and moveable stations depending upon the Ministry of Roads and Public Works and upon the States, as also with the provisions set forth in the International Conventions and Regulations in force.

Sole paragraph.—The naval stations and those belonging to the Army shall, nevertheless, be always obliged to comply with the provisions of Articles 8 and 9 of the London Convention dated 1912, and that of Berlin dated 1906—*i.e.*, they shall as far as possible avoid disturbing the service of the other stations of the same kind, and shall receive with absolute priority the signals of distress.

ART. 8.—It shall be the duty of the stations constituting the national system depending upon the Ministry of Roads and Public Works, the Ministry of War and the Ministry of Marine and upon the States to prefer normally the watch service having in view any disasters on the seas or the rivers and other accidents, in accordance with Art. xxi., as regards preference, and Art. xxxii. regarding the hearing during three minutes after every period of 15 minutes of transmission (International Radiotelegraphic Regulations of 1912).

Section 1.—The stations depending upon the Ministry of Roads and Public Works and upon the States are intended for the service of public correspondence in general, between the land and the ships at sea, and the rivers, as also overland or any special services pertaining to public administration.

Section 2.—The Army and Navy stations are intended for the official correspondence, and, without prejudice to such services, for private correspondence of their crews and men (soldiers).

Section 3.—Stations intended for traffic of public messages in general must give preference to the messages from the naval stations and of the Army. Correspondence with the military stations can only be preferred by the service of distress.

ART. 9.—Naval stations although erected for strategical purposes of the defence of the country along the ocean rivers, the borders of navigable river or on board ships, and notwithstanding that the

fixed stations of the Army shall be intended for the purpose of assisting in the military exercises or in the defence of the nation—they may nevertheless, whenever the Government may deem it convenient, be authorised to take care of the public service in general. In such cases these stations shall during that period be entirely subject to the provisions of the regulations in force.

Sole paragraph.—The stations on the borders, over and above the strategical use they may have, shall also serve as exchange stations for the international overland service with the bordering republics whenever it may be convenient.

ART. 10.—Out of the total number of stations of the wireless telegraph system a certain number shall be selected to take care of the general hour service in accordance with the International Convention of Paris and with the Regulations for the interior service approved by the Department of Agriculture, Industry and Commerce. (Decree No. 10,546 of the 5th of November, 1913.)

Sole paragraph.—The stations at Noronha, Rio de Janeiro, Trinidad and Juncção (in the State of Rio Grande do Sul) shall transmit message of the hour to the sea and inland as provided by the Conference of Paris, 1912.

ORGANISATION OF THE WIRELESS TELEGRAPH STATIONS.

ART. 11.—The name of fixed coastal station shall be given to all wireless telegraph stations established on firm land or on board ships permanently anchored near the coast or yet on the islands near the coast.

ART. 12.—The name of boat station shall be given to those stations of wireless telegraphy established on board a merchant ship or a man-of-war not permanently anchored.

ART. 13.—The name of fixed station simply shall be given to all and any wireless telegraph stations established on firm land and proposed to handle traffic between fixed points or between the land and ships sailing on the rivers.

Sole Paragraph.—All fixed wireless telegraph stations, coastal or otherwise, shall be connected by wires to the ordinary stations of the General Telegraph Department or to stations of other telegraph lines, provided this connection shall be deemed useful for the service, practically possible and economically convenient.

ART. 14.—The stations in general shall be organised under the following conditions :

1. In accordance with the progress of science and technics by selecting for the purpose as far as possible the most perfect apparatus ;
2. By providing them with the necessary material capable of insuring a continuous service inclusively at the boat station by providing them with reserve plants (Art. XI. of the International Regulations, 1912) ;
3. By providing them with the necessary staff capable of insuring a continuous service, the operators to possess certificates of their professional capacity, whether they be employed at the fixed stations or at the stations on board ship (International Regulations, 1912, Art. X. ; International Regulations, 1906, Art. VI., section 5).

ART. 15.—The stations shall be classified according to the energy irradiating from their antennæ, rather than according to their reach as main stations and stations of the first, second and third classes.

Section 1.—Main stations are those stations irradiating 25 kilowatts or more of oscillatory energy ;

Section 2.—Stations of the first class are those stations irradiating from 10 to 25 kilowatts exclusive ;

Section 3.—Stations of the second class are those stations irradiating from 5 to 10 kilowatts exclusive ;

Section 4.—Stations of the third class are those stations irradiating from one to five kilowatts exclusive. Stations irradiating less than one kilowatt shall be classed as third class auxiliary stations.

ART. 16.—The employment of the wave compartments shall be subject to the International Regulations (Arts. II., III., IV., XXXV., section 2) of London ; nevertheless for inland service this may be governed by local convenience and traffic.

Section 1.—For the ordinary ocean service (2nd group of stations), intended for the purpose of public messages in general, two wave compartments of 300 metres and of 600 metres shall be admitted ; one of these, however, shall be indicated in the International Nomenclature as being the normal law wave length of the station.

Section 2.—In special cases the stations of the ordinary ocean service shall be allowed to employ a wave of 1,800 metres, in accordance with the provisions of *section 2* of Art. XXXV. of the International Regulations.

Section 3.—Wave compartments below 600 metres, those of 300 metres excepted, and compartments of more than 1,600 metres will be admitted for employment for the large ocean service for messages other than public messages in general.

Section 4.—Stations intended for the sole purpose of irradiating signals to determine the position of ships shall employ waves of not more than 150 metres.

Section 5.—Every station on board ship shall be established in such a way that it will be capable of utilising, in transmitting and receiving, waves of 600 metres and of 300 metres, the former being the normal extent of the wave.

Section 6.—Every station on board ship shall be established in such a way that it will be capable of receiving calls transmitted with the normal wave.

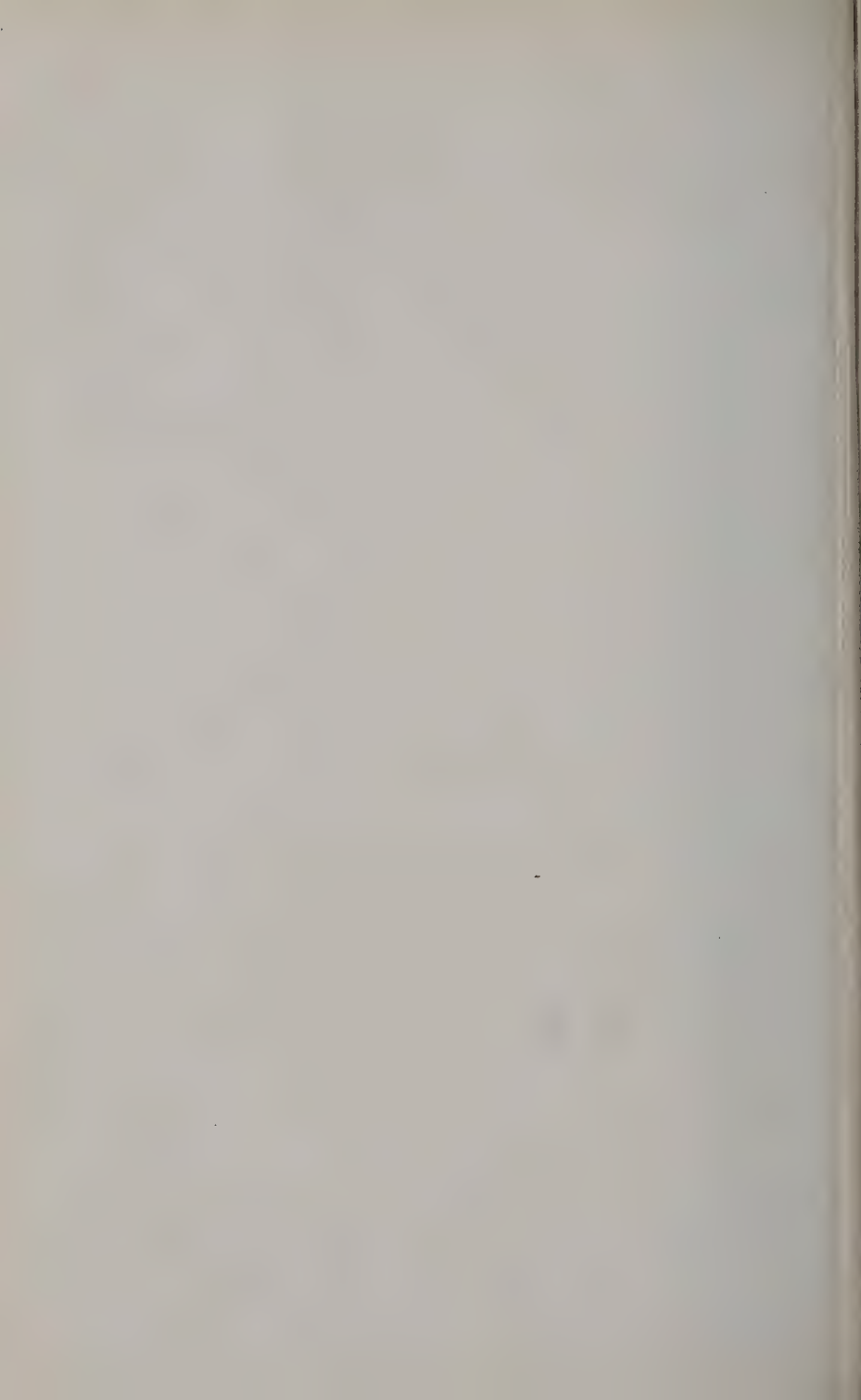
Section 7.—Waves of less than 600 metres, those of 300 metres referred to in *section 5* excepted, shall only be admitted for use by ships subject to previous authority of the Government and in special cases.

Section 8.—Ships of light tonnage materially unable to transmit with a 600 metres wave shall be admitted to utilise exclusively the 300 metres wave ; they shall nevertheless maintain their plant in a condition at any time to receive messages by means of the normal 600 metres wave.



U.S.A. ARMoured CAR WITH COLLAPSIBLE OBSERVATION
AND WIRELESS TURRET.

[To face page 196.]



Section 9.—In the event of difficulty of communications and in order to avoid momentary interference, a regulation length of wave may be employed other than the normal length; the normal length shall, however, be resumed when the momentary difficulties to traffic shall cease.

Section 10.—Naval stations and the stations of the Army shall transmit by means of waves of such length as shall as far as possible avoid their services interfering with the service of public traffic in general. Such lengths, for instance, as 200 metres, 800 metres and 1,200 metres approximately.

GENERAL TECHNICAL COMMITTEE.

ART. 17.—The localisation, the establishment and the traffic of fixed wireless telegraph stations under the control of the Departments of Road and Public Works, of War and of Marine and of the different States shall, in every case, be considered by the Combined Technical Committee in view of their utility in regard to trade, to shipping and to the defence of the national territory, so as to conciliate in the best possible manner the interests of each.

Sole Paragraph.—In grading the power of each station the provisions of Decree No. 10090 of February 1st, 1913, shall be observed.

ART. 18.—Whenever the civil and military authorities directly interested shall have to make scientific or technical experiments in wireless telegraphy or telephony they shall in the first place notify their intention to the Combined Technical Committee for the purpose of co-ordinating and obtaining the best possible advantage out of the combined efforts of those Departments of which the members of the Committee are the delegates.

Section 1.—With the exception of the Federal and State authorities, no other authorities or private parties shall be allowed to make experiments or to erect and equip for purposes of experiments or for tuition wireless telegraph or telephone stations unless they shall first obtain the authorisation of one of the departments of the Administration, according to each case, after hearing the Combined Technical Committee.

Section 2.—The Combined Technical Committee shall be informed by the Departments interested of the results obtained with the different types of apparatus or systems of erection employed by the different stations under operation.

Section 3.—It shall pertain to the Combined Technical Committee to consider the complaints of a technical nature relative to the working of the different stations when informed by the Federal Departments and the administrations of the different States, by Private Enterprises or by Foreign Powers.

Section 4.—In the cases where the experiments of wireless telegraphy or telephony shall pertain to the initiative of the Combined Technical Committee by proposal made to any of the Departments of the Administration interested therein, the expense shall be for account of the Department having ordered such experiments.

ART. 19.—The Government shall take action in accordance with the laws in force with regard to ordinary telegraph matter against all those who shall operate wireless telegraph or telephone plants without permission, whether publicly or under concealment.

Sole Paragraph.—The fault to which this article refers shall in time of disturbance of the public order or of war, be considered respectively as an act of resistance against the public authorities or as spying.

ART. 20.—Whenever the Government may be obliged to maintain wireless telegraph stations for the public service in general in fortified places, whether of the Army or of the Navy, the matter will be considered by the Combined Technical Committee, in order to avoid prejudice in any way to the military services.

Section 1.—The stations to which this article refers shall be in time of peace operated by civilians, and in time of disturbances of the public order or of war, by military operators.

Section 2.—While on duty in fortified quarters, whether of the Navy or of the Army, the civil employees shall be under the military rule.

ART. 21.—In case of interruption to the service of the overland telegraph lines the wireless telegraph stations shall take care of the telegraphic service of the section where the interruption has occurred, without prejudice, however, to the "watch" and "ocean" services.

Section 1.—The military stations of the Navy and of the Army shall also undertake to forward the ordinary telegraphic service if they are situated in the section where the interruption has occurred, and are also to do so without prejudice to the military service.

Section 2.—The stations established along the rivers Parana, Uruguay and São Francisco shall, when necessary, serve as exchange stations between the borders and the coast.

Section 3.—For the better co-ordination of the services the Combined Technical Committee shall keep up to date the plan of the whole system referred to in Decree No. 10,090 of February 1st, 1913, so as to be able to be supplied to the interested authorities, whether federal or of the States.

GENERAL TELEGRAPH DEPARTMENT.

ART. 22.—The establishment and operation of the wireless telegraph and telephone stations intended for the service of the public in general and other services depending upon the Department of Roads and Public Works shall be pertinent to the General Telegraph Department.

Section 1.—The same department shall also centre in its hands all matters concerning the collection of taxes and administrative connections with foreign wireless telegraph services and with the International Office at Berne.

Section 2.—It shall see that the International Regulations for the transmission of commercial messages from the stations on board merchant ships are properly observed.

Section 3.—It shall exercise the supervision of private enterprises operating in wireless telegraphy and telephony.

Section 4.—It shall have the power to train wireless telegraph operators in accordance with the regulations in force by administering to them theoretical and specially practical tuition (Articles 271, 367 and 337 of the Regulations of 1911 in force) and awarding them the certificates referred to in the International Regulations (Art. X. of 1912) and in the present Regulations (Art. 14 section 3).

Section 5.—Certificates of wireless telegraph operators awarded by the Institutions of Higher Studies and by the private professional schools shall be acknowledged by the Government after the approval of the Combined Technical Committee.

Section 6.—For the purposes of the experiments referred to in sub-section *d* of Art. 19 of Law No. 2,050 of the 31st December, 1908, and which may interest the Department of Roads and Public Works a credit shall be reserved out of the appropriation for "wireless telegraph services."

ART. 23.—In military wireless telegraphy the same procedure shall be adopted as for civil wireless telegraphy in so far as the tuition of the wireless telegraph operators are concerned, so that the programs being formed on a common basis the certificates may also be considered as equivalent.

ART. 24.—Bearers of Certificates of qualification awarded by the schools referred to in Arts. 22 and 23 alone, shall be admitted to take charge or to serve as employees of the wireless telegraph stations whether fixed or moveable, civil or military, belonging to or authorised by the Government.

Section 1.—The provisions contained in Art. X. of the International Regulations of 1912, extended by the provisions of Art. VI. of the International Regulations of 1906 relative to the professional qualification of wireless telegraph operators shall be strictly observed.

Section 2.—The programmes and the course of proceedings at the schools shall be subject to the approval and supervision of the Combined Technical Committee in order to insure the compliance with the provisions of the present regulations concerning the matter.

ART. 25.—Authorisations, permissions and licences for the establishment and operation of wireless telegraph and telephone services whether in the territory of the Union or of the different States shall be subject to the provisions in force relative to the ordinary telegraphic services. The new services are already placed on a like footing with the ordinary service under the International provisions already approved by Congress, and by a decree of the executive power dated November 27th, 1911, issued under No. 9,148 as per sole paragraph of Art. 2 thereof.

ART. 26.—Telegraph stations erected on board merchant ships and ships of the coastal trade as referred to in Art. 173 of the Regulations approved by Decree No. 10,524 of October 23rd, 1913, shall be subject to the international provisions contained in Arts. IX. and XI. of the Regulations of London.

Section 1.—Licences for the establishment of the stations shall be applied for before the Department of Roads and Public Works to which it shall pertain to exercise the supervision referred to in Arts. IX., X., XI. and XII. of the Regulations of London.

Section 2.—The supervision of the stations erected on board ships as referred to in the last preceding article shall be under the care of the General Telegraph Department, to which the Department of Roads and Public Works shall give notice of the licences given.

Section 3.—Licences shall be given under the form hereunto appended.

Section 4.—The initials or indexes of calls from the stations on board national ships possessing the necessary licences shall be given by the General Telegraph Department in accordance with the provisions of the International Regulations in force (Section 2 of Art. V.), and in accordance with the notices issued by the International Office at Berne.

Section 5.—With regard to infringements and penalties occurring in view of the licences given to ships and certificates of operators, the provisions of Arts. IX. and XII. of the Regulations of London shall be strictly enforced.

ART. 27.—The stations on board merchant ships or men of war shall be classed by the Government in three different classes which shall be expressed on the licences in the case of merchant ships, viz. :

1. Stations with permanent service (N).
2. Stations with a limitation of service.
3. Stations not charged with special obligations (X).

The stations of the first class shall maintain continuous watch. The stations of the second class shall be permanently attent during the time of service, and out of this time of service during the first ten minutes of each hour. The stations of the third class shall not be subject to a regular service of attention (Art. XII., section 3, of the Regulations of London).

ART. 28.—Stations on board national ships must, and stations on board foreign ships may, communicate free of charge once a day to the fixed stations the meteorological bulletins for the Directorate of the Meteorological Service.

Section 1.—The ships shall also receive communication of the bulletins of the Meteorological Service that might interest navigation.

Section 2.—If the ships request the Meteorological Service to transmit to them meteorological information, the communications shall be made by means of taxed service advices, and the taxes shall be charged to the account of the ships to which such messages were transmitted.

Section 3.—Communication regarding the weather involving information relative to precautions to be taken against danger shall be transmitted free of charge and urgent.

ART. 29.—All wireless telegraph stations without exception, whether fixed or movable, shall keep a book of entries in which, besides the messages exchanged, note shall be taken of the commencement and winding up of the services when the case is not of a permanent service, of accidents that may have occurred, of difficulties of communication, damages to the apparatus, etc.; in short, of all details of the service.

Sole paragraph.—The said stations shall also possess schematic charts of the ocean or of the rivers for the purpose of registering the position of the movable stations.

ART. 30.—The provisions of the international regulations concerning wireless telegraphy and of the Regulations of the General Telegraph Department shall apply respectively to foreign and home relations. In the home service the provisions of the present regulations for wireless telegraphy shall prevail over such provisions of the regulations of the General Telegraph Department as may be contrary thereto.

Sole paragraph.—The provisions contained in military regulations and interesting wireless telegraph service in general shall be communicated to the General Telegraph Department by the Combined Technical Committee.

CHAPTER II.

Manner of Wording and Depositing Wireless Messages.

ART. 31.—Wireless telegraph messages shall contain as first word of the preamble the indication of the service "radio" (see Arts. XIV, and XV, of the Regulations of London).

Section 1.—The text of wireless messages may be in any one of the languages admitted by the International Telegraph Regulations for the time being in force (Revision of Lisbon, Art. 8, section 2).

Section 2.—Wireless messages made up by means of the International Code of Signals, designed under the index P R B, shall be transmitted to their destination untranslated.

Section 3.—Cases of doubt in the matter of traffic shall be considered and decided by the General Telegraph Department.

CHAPTER III.

Transmission of Wireless Messages, Calls, General Provisions for Traffic.

Consult International Telegraph Regulations of 1908, Art. LXII., Chapter 12, corresponding to Art. 9 of the Convention of St. Petersburg. Consult also Chapter 6 of the International Wireless Telegraph Regulations, 1912.

TRANSMISSION.

ART. 32.—For the transmission on wireless messages, the signals used shall be those of the International Morse Code.

Sole paragraph.—Telegraphic sign shall be transmitted in accordance with the provisions and rules established by the regulations in force issued by the General Telegraph Department. (Consult Regulations of Lisbon, Chapter 10, Art. XXII.).

ART. 33.—Ships in distress shall employ the signal S O S, which shall be repeated at fixed intervals accompanied by the necessary information.

Upon noticing the signal of distress any and every station shall immediately interrupt the correspondence in hand, which shall not be resumed until the station shall have ascertained that the communication by the call for assistance is concluded.

Section 1.—Stations noticing a call for assistance shall observe the indication supplied by the ship making the call, not only in the order of communications but also in the termination thereof.

Section 2.—Whenever a series of calls for assistance shall be accompanied by the indexes of call from a certain station, this latter station alone shall be expected to attend, unless, however, the said station shall not reply.

In the absence of indication of a certain station, any station noticing the call for assistance shall be under the obligation to reply.

Section 3.—Wireless telegraph messages from or relative to ships in distress shall have preference above all others.

ART. 34.—In giving or requisiting explanations in regard to wireless telegraph services, the different stations shall make use of the signals contained in the list appended to the present regulations and to the International Regulations, 1912.

ART. 35.—In transmitting wireless telegraphic messages all the special indexes contained in the International Telegraph Regulations, revised in Lisbon, shall not be admitted; only those indexes contained in the International Wireless Telegraph Regulations of London, Art. XXXVIII., shall be admitted.

Section 1.—With regard to wireless telegraphic messages for transmission by express, when the expenses shall have been collected from the receiver, the General Telegraph Department shall establish special instructions which shall be notified to the International Office.

Section 2.—It will be permitted to make special indication relative to the number of days during which wireless telegraphic messages shall have to remain in deposit at a coastal station awaiting the passage of the ship for which they are intended.

ART. 36.—As between any two stations wireless telegraphic messages of the same class shall be transmitted separately and alternately or by series of various messages according to the indication of the coastal station, on condition that the time for transmission of each series shall not be more than 15 minutes.

Section 1.—Before commencing to exchange correspondence the coastal station shall advise the station on board ship whether the transmission will be made alternatively or by series. Then the coastal station shall commence transmitting or notify its readiness to receive.

Section 2.—The transmission of each wireless telegraphic message shall be preceded by the signal *—.—* and terminated by the signal *—.—*, followed by the index of the sending station and of the signal *—.—*. In the case of a series of messages, the index of the sending station and the signal *—.—* shall only be given at the end of the series.

Section 3.—Wireless telegraph messages shall be transmitted in the following order:

- (a) Messages of the State.
 - (b) Messages of the Service.
 - (c) Private urgent messages, but only in respect of their course over the overland lines.
 - (d) Ordinary private messages.
- (Compare Regulations of Lisbon, Art. XXXII.)

CALLS.

ART. 37.—The control of the service of the stations on board ships lying within the maximum reach of any coastal station shall be exercised by the latter.

Section 1.—Stations on board ship and also limited coastal stations shall conform with the instructions received from the permanent station.

Section 2.—The permanent coastal station shall attend and cause attention to be given to ships on the point of leaving the zone of their common reach, having in view the position, direction and speed of the said ships.

Section 3.—The permanent coastal station shall have authority to transmit orders for silence; the station on board ship shall thereupon cease transmitting ordinary messages until it shall be allowed to continue.

Section 4.—Besides in the case of traffic conveniences, silence may be imposed in view of the provisions of Art. 45 of the Regulations of London (hour service).

Section 5.—Any station proposing to transmit with high power shall first issue three times the sign of attention, M I M (— . — . —), using the lowest power necessary to reach the neighbouring stations. It shall not commence transmitting with high power before 30 seconds after having issued the sign of attention.

Section 6.—Whenever any one coastal station shall receive calls from several stations on board ships at one time, it shall decide as to the order in which those stations shall be admitted to transmit.

In taking this decision the coastal stations shall have in view simply the necessity of permitting any one station interested to exchange the greatest possible number of wireless messages.

Section 7.—In the event of any one station failing to attend to the calls issued three times with an interval of 2 minutes, the said calls shall not be renewed before a further interval of 15 minutes, and even so when the station having made the call shall be certain that there is no other wireless telegraphic communication under way.

ART. 38.—In general it is the station on board ship that calls up the coastal station, whether there be wireless messages for transmission or not.

Section 1.—The station on board ship shall not call up the coastal station, chiefly in the zones of a heavy traffic, before it comes within a distance of $\frac{3}{4}$ of the normal reach of the latter.

Section 2.—Before proceeding to make calls, the coastal station or the station on board ship shall regulate to the highest sensitive point possible their receiver system, and ascertain that no other correspondence is being held within the zone of reach; when they shall proceed otherwise, upon remarking any disturbances of correspondence the coastal station or the station on board ship shall immediately cease calling, unless they shall find that the calls are not apt to disturb the communications under way.

Section 3.—On the other hand, the coastal stations or the stations on board ship when answering calls made upon them shall take the same precautions.

Section 4.—If notwithstanding these precautions the transmission of any wireless telegraphic message shall be interfered with, the call should cease for the traffic of public correspondence. This station, in making the request, shall indicate the approximate duration of the delay.

Section 5.—The station on board ship shall inform the coastal station to which it shall have signalled its presence the moment at which it shall have to interrupt communications and the time during which this interruption shall last.

Section 6.—The station on board ship shall only be allowed to make calls upon the next coastal station in cases where, owing to difficulties of traffic, it shall not have been possible to establish correspondence with the preceding station, out of whose reach it has just come.

Section 7.—In making calls the stations shall employ the normal wave of the station on which they shall have to call.

Section 8.—All stations shall seek to transmit by using the lowest possible intensity.

ART. 39.—The call shall be composed of the signal K A..... (—.—) of the index of the station upon which the call is made, issued three times, that of the preposition "from" (de) followed by the index of the transmitting station, repeated three times.

Section 1.—The station called upon shall reply by transmitting the signal —.— followed by the index of the corresponding station repeated three times; of the preposition "from" (de) and of the signal K (—) (invitation to transmit).

Section 2.—Stations wishing to entertain correspondence with ships, but not knowing the names of such as may be within their reach, shall employ the signal of investigation (—.—.—.—).

Section 3.—The provisions of the present article and of section 1 shall also apply for transmission of the signal of investigation and the reply to the said signal.

GENERAL PROVISIONS.

ART. 40.—Transmissions exchanged between stations on board ship shall be effected in such a way that they shall not interfere with the services of the coastal stations, and the latter shall have the right of priority for public correspondence.

ART. 41.—As soon as the coastal station shall have answered the call, the station on board ship shall supply the details hereunder stated, in the event of there being messages for transmission; these details shall likewise be supplied on demand by the coastal station:

(a) Approximate distance in nautical miles from the ship to the coastal station;

(b) The position of the ship, indicated in a concise form adequate to the circumstances of each case;

(c) The name of the next port of call of the ship;

(d) The number of wireless messages if of normal length (20 words) and the number of words in case of exceptionally long messages;

(e) The speed of the ship expressed in nautical miles when the coastal station shall require this information expressly.

Section 1.—On answering the coastal station shall inform the number of wireless messages or the number of words to be transmitted to the station on board, as the case may be ; it shall also indicate the order in which the transmission shall be effected.

Section 2.—In case the transmission cannot be effected immediately, the coastal station shall inform the station on board of the probable time it shall have to wait, and in case this delay shall be more than ten minutes shall also give the reasons therefor. The station on board ship shall await the invitation to transmit K (—.).

Section 3.—In the event of a station on board ship being called up and being unable to receive momentarily, it shall advise the station from which the call is made of the approximate time it shall have to wait.

Section 4.—In the case of exchange of correspondence between two stations on board ships, it shall pertain to the station on which the call is made to determine the order of transmission.

ART. 42.—Whenever a wireless message shall contain more than 40 words, the sending station shall interrupt transmission by means of the signal U D (interrogation) (.—.—.) after each series of 20 words more or less, and shall not continue transmitting until it shall have received from the receiving station the repetition of the last word properly understood followed by the signal above referred to, or, if the reception was satisfactory, then followed by the signal —.—

Sole Paragraph.—In case of transmission by series, the notice of reception shall be given after each message.

ART. 43.—When the signals become doubtful it will be well to exert the best efforts to conclude transmission.

For this purpose the message shall be transmitted three times at the most, on demand of the receiving station.

Section 1.—If notwithstanding this treble transmission the signs shall still be unintelligible, the message shall be cancelled.

Section 2.—If the receipt advice is not received, the transmitting station shall make a fresh call on the receiving station. If no answer is made after the third call the transmission shall not proceed.

In this case the sending station shall have the faculty to obtain the receipt advice through another wireless telegraph station by utilising in case of necessity the overland lines.

ART. 44.—When the receiving station shall be of opinion that, notwithstanding a defective reception, the message can be delivered, it shall insert at the end of the preamble the service remark "reception doubtful," and shall forward the message.

Sole Paragraph.—In the event of the telegraph lines being utilised the General Telegraph Department shall recover the taxes in accordance with the provisions of Art. XLII. of the Regulations of London. But if the station on board shall subsequently transmit the message to another coastal station, the G.T.D. shall recover taxes relative to one sole transmission.

ART. 45.—Receipt notices shall be given in the manner determined by the index of the sending station and followed by the index of the receiving station.

Section 1.—The end of the service between any two stations shall be indicated by both by means of the signal ...— followed by their indexes respectively.

Section 2.—Ships not possessing indexes shall substitute this sign by their own name in full.

ART. 46.—Coastal stations whose service shall not be of a permanent nature shall not be permitted to wind up their service until they shall have transmitted their messages to the ships within their reach, not until they shall have received from the ships all the messages announced.

Sole Paragraph.—These provisions shall also apply in cases where ships shall notify their presence before the work of station is definitely ended.

ART. 47.—In transmitting messages from a station on board ship to a coastal station the date and hour of presentation at the station on board shall be included in the preamble.

Sole Paragraph.—In cases of re-transmission the coastal station shall cause to appear as of the station of origin the name of the ship from which the message was originally sent, and also, if possible, the name of the ship having served as intermediary, if any.

ART. 48.—In transmitting, receiving, verifying the words, repetitions and doubtful cases, the proceedings shall be in accordance with the provisions and rules in force for ordinary traffic as contained in the Regulations of the General Telegraph Department, 1911, and in the International Telegraph Regulations (1908).

ART. 49.—The sender shall have the right to indicate the number of days, but not more than 30 days, during which the telegram shall remain in deposit for transmission at the first opportunity to its destination.

Section 1.—The indication "radio in deposit" shall be reckoned as one word.

Section 2.—After the delay indicated shall have expired, or when the coastal station shall have acquired a certainty that the ship is already beyond the reach of the next coastal station, it shall advise the sender of the fact.

ART. 50.—In the national service, as well as in the international service, the provisions of Art. VI. of the Wireless Telegraph Regulations of London as hereunder shall strictly apply—viz. :

- (1) Exchange of superfluous signals or words shall not be allowed.
- (2) Tests and exercises shall only be admitted when not interfering with the service of other stations.
- (3) Tests to be effected with wave lengths other than those admitted for public correspondence and with the lowest possible energy.

ART. 51.—The dangerous parts of the apparatus in the different stations shall be determined by means of plainly visible marks, and if necessary they shall even be covered up in order to avoid contact with the operators or visitors.

ART. 52.—The address of wireless messages for transmission to shipping shall be as complete as possible. They shall contain obligatorily the following :

(a) Name and qualification of the addressee, with full information, if any ;

(b) Name of the ship exactly as contained in the first column of the nomenclature ;

(c) Name of the coastal station exactly as contained in the nomenclature.

Section 1.—The name of the ship may be substituted by an indication of the route followed by the ship and determined by stating the port of origin or of destination or any other equivalent reference, at the risks and for account of the sender.

Section 2.—The name of the ship exactly as contained in the first column of the nomenclature shall in every case, and notwithstanding its length, be reckoned as one sole word when contained in the address.

Section 3.—The sender shall indicate the name of the coastal station through which the message is to be transmitted to the ship.

ART. 53.—Transmission to the stations on board ship as a rule shall only be effected when the ships on passing by call on the coastal station within their reach.

Sole Paragraph.—In wireless messages transmitted from on board ship the name of the coastal station shall appear in the preamble beside the name of the ship from which it was originally sent and followed by the name of the intermediary ship, if any ; also the date and hour of presentation to the station on board ship.

ART. 54.—As a rule the stations on board should transmit their messages to the nearest coastal station.

Section 1.—The sender on board ship shall have the option of choosing the coastal station through which he desires his message to be forwarded. In this case the ship's station shall wait until the station selected shall be the nearest coastal station.

Section 2.—On the borders of the neighbouring Republics the transmission referred to in the last preceding paragraph may be made by a coastal station situated farther off. For this purpose it shall become necessary for such coastal station to be situated in the country of destination of the message and for the ship from which the message was sent to sail under the flag of the same country. (Art. XXXV., section 2, of the International Regulations of London.)

Section 3.—In cases where the stations on board ship shall be in a position to choose between different coastal stations situated at approximately equal distances, then they shall give preference to the coastal station established in the country of destination of the message or serving for the normal transit of wireless messages sent thereinto.

CHAPTER V.*

ART. 55.—The tax of one wireless telegraphic message shall consist of the following, as the case may be :

1. The coastal tax, due to the coastal station.

* There would appear to be some clerical error here, either on the part of the draftsman of the Law or the translator. The Law, however, as it stands in our text is complete; the error resides in the consecutive numbering of the chapters.—EDITOR.

2. The ship's tax, due to the ship's station.
3. The tax due for transmission over the telegraphic lines, reckoned according to the common practice.
4. The transit taxes of the coastal stations or of the intermediary ships and the taxes relative to the special services demanded by the sender.

ART. 56.—The entire amount of the tax shall be recovered from the sender with the exception of the following :

1. The express rates (Art. LVIII., section 1, of the Telegraph Regulations, revised in Lisbon).

2. The amount of the taxes applicable on such reunions or alterations of words, not allowed, as may be detected by the station of destination (Art. XIX., section 9, of the Telegraph Regulations).

These taxes shall be recovered from the receiver or addressee.

Sole Paragraph.—Stations on board ship should possess the necessary tariffs enabling them to apply these provisions, and they shall receive them in due course from the General Telegraph Department. They shall, however, have the faculty to consult the coastal stations with regard to the taxation of wireless messages, in case they do not themselves possess the necessary information for the purpose.

ART. 57.—The General Telegraph Department shall organise instructions relative to the taxation of the wireless messages, and shall in so doing consider carefully the various cases of the traffic. These instructions shall be distributed among the parties interested in the matter.

Sole Paragraph.—The said department shall further organise instructions for the keeping of proper accounts in order to facilitate and simplify the extraction of the different accounts.

CHAPTER VI.

ACCOUNTS.

ART. 58.—Coastal and ship's taxes shall not be considered in the accounts provided for under the International Telegraph Regulations. Accounts relative to these taxes shall be settled by the administration of each one of the countries interested.

Section 1.—If the coastal stations shall be independent upon the Department of Roads and Public Works, the accounts shall be made up by the General Telegraph Department and communicated by the said department to the interested parties, whether public administrations or private parties.

Section 2.—In cases where the coastal stations shall be under the control of the private enterprises, the holder thereof shall have the right to arrange his accounts directly with the interested parties (Art. XLI., section 1, of the Radiotelegraphic Convention of London) without the interference of the General Telegraph Department.

ART. 59.—It shall pertain to the General Telegraph Department to make arrangements with private enterprises operating wireless telegraph plants in the country whether by means of fixed or movable stations, for the establishment of mutual traffic and for the eventual settlement of accounts in accordance with the provisions of Art. XLII. and paragraphs of the Regulations of London.

ART. 60.—It shall pertain to the Department of Roads and Public Works to make special arrangements with the neighbouring republics, whether directly with their respective Governments or with private parties established and operating therein, for the purpose of establishing mutual traffic and adopting the provisions relative to keeping of accounts (Regulations of London, Art. XLII., section 4).

CHAPTER VII.

QUALIFICATION OF WIRELESS OPERATORS.

(Compare Art. 10 of the Regulations of London, 1912, and Art. 6, section 3, of the Regulations of Berlin, 1906.)

ART. 61.—Certificates of qualification of operators intending to work at the fixed and movable wireless telegraph stations which shall be issued by the official schools or by private schools acknowledged by the Government in accordance with the present regulations shall attest the professional standing of the operators with regard to :

(a) Transmission and reception by the ear of messages drawn up in plain language with the Morse International alphabet at the rate of 20 words per minute at least—each group of five letters counting as one word.

(b) Regulation of the apparatus and acquaintance with their work. This preparation should embrace the study of the most common systems, chiefly of those systems employed in the Brazilian system of wireless telegraphy.

(c) Acquaintance with the provisions of the Conventions and Regulations and of the rules applicable to the exchange of wireless and ordinary telegraphic communications.

ART. 62.—In passing their examinations the candidates for certificates shall :

(a) Operate an ordinary transmission with the Morse during five minutes consecutively, at a minimum rate of 20 words per minute, each group of five letters counting as one word.

(b) Receive and hear legibly, at the same rate mentioned above, with the aid of a double 'phone receiver mounted to the head in the ordinary manner for reception in wireless telegraphy.

(c) Understand the simple diagrams of the electrical connections of the apparatus used in the system adopted for the examination.

(d) Enumerate the principal parts of the apparatus stating the use thereof, in such a way as to demonstrate that they would be capable of mounting the apparatus with the assistance of the diagrams.

(e) Mention the accidents occurring more frequently, and the means usually employed to repair them.

(f) Explain what is to be done in order to pass from one wave-length to another in transmitting or in receiving.

(g) Effect (1) regulations and adjustments ; (2) alteration of wave-lengths ; (3) reduction and increase of transmission energy ; (4) investigation of accidents and remedies therefor.

ART. 63.—There shall be two classes of certificates: first and second class. The sole difference between these two classes of certificates shall be in respect of speed of transmission and of reception; first-class certificates shall correspond to a rate of 20 words, at least, per minute; those of the second class shall correspond to a speed ranging between 12 and 19 words per minute.

ART. 64.—In the wireless telegraph stations on board ship due regard will be paid to the provisions of Art. X. of the International Regulations of London relating to the utilisation of operators holding certificates of the first and second classes.

Sole Paragraph.—In the fixed stations service shall be assumed at least by two operators holding certificates of the first class; holders of certificates of the second class shall be admitted as assistants. Only in cases of urgency may transmissions be effected by non-certificated operators.

ART. 65.—With a view to the preparation of wireless telegraph operators the Government shall have the power, subject always to the provisions of the Organic Law of Tuition, to grant subventions to private schools in order to facilitate the preparation of these operators in the capital of the republic and in the different States.

Sole Paragraph.—For the official schools, whether civil or military, the Government shall have the power to contract, either in the country or abroad, qualified persons for the purpose of administering practical tuition.

ART. 66.—The certificates shall testify to the professional standing of the wireless telegraph operators in accordance with the provisions of Arts. 61, 62 and 63, and shall contain a statement to the effect that the holder thereof shall keep the secrecy of correspondence in accordance with the national and international prescriptions.

ART. 67.—Certificates awarded by private schools must be registered at the Department of Roads and Public Works, where they will be attested by the Government in accordance with the requirements of the present Regulations and of the International Regulations, Art. 10.

Rio de Janeiro, January 14th, 1914.

F FORM OF LICENCE.

Coat of Arms)

REPUBLIC OF THE UNITED STATES OF BRAZIL—DEPARTMENT OF
ROADS AND PUBLIC WORKS.

LICENCE for the establishment and operation of wireless telegraph stations on board ships in accordance with Arts. 9 and 13 of the International Regulations of London, and with Art. 173 of Decree No. 10,524 of October 23rd, 1913, referring to merchant and coast trade navy.

LICENCE is given by the Department of Roads and Public Works to during the period of two years as from the present date, to—

I.—Establish and operate on board the steamship one wireless telegraph station of the system known as subject to the following conditions: (1) the station to be established shall comply with the specifications hereunto appended; (2) the apparatus shall be syntonized; (3) the apparatus shall be capable of supporting traffic by means of waves of 300 and of 600 metres and other lengths not greater than 600 metres, the use of which may be authorised by the Government; (4) the speed of transmission and of reception of wireless messages under normal circumstances shall not be lower than 12 words per minute, counting five letters to the word.

II.—Transmit and receive wireless messages by means of the station licensed for establishment on the said ship and of the stations established on board other ships and of the fixed stations; all in accordance with the regulations in force.

The present licence is granted subject to the following conditions:

1. The licensed station shall be operated solely by the licensee or by another person duly authorised by law;

2. The operators shall not interfere with the signals from the stations of the Army and of the Navy; they shall observe the Conventions and Regulations in force, and they shall further transmit wireless messages on a footing of equal treatment, without favours or preferences.

3. The operators shall whenever possible receive from ships and lighthouses all calls for assistance and signals of distress, and shall answer such signals and forward them with the least possible delay to the proper authorities, either by means of his own station or through other stations or yet by another means.

4. The station shall only be operated by a holder of a certificate awarded by the Government as provided for in the National Wireless Telegraph Regulations in force.

5. The licensee and his operators shall keep complete secrecy of the wireless telegraphic correspondence in general, whether transmitted to his station or received for transmission to others.

6. Licensee shall keep proper accounts of the traffic of his station and keep on file all the messages transmitted and received by the said station, each message to bear a number of identity, the date and note of origin and destination. He shall keep all the messages received and transmitted for the period of time stipulated in the International Regulations. The archives may be inspected by the General Telegraph Department whenever it may be deemed convenient.

7. The licensee shall make arrangements by entering into a contract with the General Telegraph Department with regard to the accounts of traffic between the coastal stations and the stations licensed hereby.

8. The General Telegraph Department through one of its delegates may, at any time, inspect the station licensed hereby, and examine the apparatus and the station in general and in every detail.

9. Licencee shall keep at the station licensed hereby the present licence or a certified copy of same ; also all printed matter necessary for the traffic in accordance with the Convention and Regulations in force.

10. This department of the Administration shall have the power to interrupt the present licence in case of non-observance or failure on the part of licensee to comply with the clauses hereinabove stipulated.

The station authorised by the present licence shall be employed in the service of in accordance with section 3 of Art. 13 of the International Regulations of London, 1912.

Directorate General of Post, Telegraphs and Light

..... *Director General.*

..... *Director of the Division.*

ATTEST.

..... *Director General of Telegraphs.*

G

WIRELESS LAW NO. 3,296.

JULY 10TH, 1917.

The National Congress resolves :—

ART. 1.—The service of radio-telegraphs (telegraphs without wires) in the territories and territorial waters of Brazil is exclusively within the sphere of federal Government.

Sole Paragraph.—The service of radiotelegraphy comprises also radiotelephony (telephones without wires).

ART. 2.—The establishment and exploitation of radiotelegraph stations are within the sphere of the Ministry of Public Works, in respect to its application of a civil character and the Ministries of War and Marine in reference to its applications destined to national defence and to the service of the Army and Navy.

Sole Paragraph.—The three above-mentioned Ministries will enter into an agreement in respect to the localities in which must be established the stations necessary for commerce, for navigation and for the defence of the national territory.

ART. 3.—The Government may give permission to third parties, nationals, without monopoly whatsoever, to install or work one or more high-power stations in suitable places on the littoral ; under the terms of the International Regulations concerning wireless telegraphy and also the Brazilian regulations which are in force for the execution of the same service ; for the exclusive purpose of establishing inter-oceanic and inter-territorial communications with corresponding stations in other countries.

Par. 1.—These stations must be linked with the National Telegraphs, by whose intermediary shall be collected and distributed the international radiotelegraphic service to and from Brazil in such a manner that the Government shall receive the terminal rate in force.

Par. 2.—The rights that are conferred and the disposals contained in this article may only be used by the Government after the conclusions adopted in respect to this subject by the International Pan-American Convention, which at the recent conference in Buenos Aires was arranged should be held at Washington in 1917.

ART. 4.—The States within the area of their territories which are not yet served by telegraphs with or without wires, and may wish to establish radiotelegraphic stations, shall interest the Department of Telegraphs to install and work them, debiting the respective costs against such States, and for the purposes of the adjustment of the accounts shall be considered as mutual traffic administrations with the Department.

ART. 5.—The National shipping companies whose steamers have accommodation for more than 50 passengers and whose voyages are longer than 150 miles from the port of origin of its ships and the site of the registered office of the company must install on board of such steamers a radiotelegraphic station with a minimum range of 100 nautical miles, which shall be worked by an operator who holds a certificate of fitness granted by competent authority. The installations on board shall be provided with emergency apparatus and battery which will permit a continuation of the service in case of the failure of supply of electrical energy by the generators that depend on the main installation.

ART. 6.—Foreign ships will be permitted within or without the territorial waters of Brazil to use the radiotelegraphic stations which they have mounted on board to correspond with the coastal stations erected by the Department of Ways and Public Works previously being authorised by the same Ministry or the Department to this end and subject to the prescriptions and regulations governing this service.

Paragraph.—Foreign warships will be licensed by the authority designated by the Minister for Marine.

ART. 7.—The establishment and working of the coastal radiotelegraphic stations and others of a civil character in the interior of the country will be entrusted to the Department of Telegraphs, to which also will fall the duty of the superintendence and carrying out of all the service of fiscalisation in relation to the employment of this kind of telegraph system by the State by national shipping companies whether by fixed or moving stations and the execution of administrative acts, the promulgation of the dates of openings, the range and the class of each station and the inauguration of proceedings relative to misdemeanours committed against this branch of the service.

Sole Paragraph.—The said Department shall create a special section to which shall be entrusted the management of this service, and also it shall form a school of radiotelegraphy, and it shall have authority to contract within or without the country with a professional teacher to take charge of the said school. The only persons qualified or admissible for the personnel of the said radiotelegraphic stations shall be nationals, holders of a certificate of competency issued by the above school, or by other holders of diplomas, admitted to work in the country.

ART. 8.—All the radiotelegraphic stations that were established in Brazilian territory and on board of national ships and on board of foreign ships whilst they remain or navigate on the rivers or territorial waters of Brazil, and claim to establish communication with the national stations for this purpose authorised, must be subject to the rules and regulations of the interior and international services that may be in force.

ART. 9.—Radiotelegraphic correspondence is authorised between national mercantile ships and also between them and foreign ships that possess radiotelegraphic stations aboard as well as between the said ships and the Brazilian coast stations dependent upon the Ministry of Public Works.

ART. 10.—Whatever concession to persons for the establishment of a radiotelegraphic service or whatever authorisation given to use the respective apparatus installed on board foreign ships may be revoked if they do not comply with the rules and regulations or if the Ministries of Marine and War judge it necessary for the security of the country or its defence.

ART. 11.—When the civil or military Federal authorities dependants of the Ministries referred to in Art. 2 have to make scientific or technical experiments in radiotelegraphy they must give notice to the Ministries to which they depend, and when they make experiments on behalf of functionaries of other Ministries, then they must give notice to the Ministry of Ways and Works.

ART. 12.—No other besides the Federal authorities may make experiments or establish experimental radiotelegraphic stations without previous permission of the Ministry of Ways and Public Works who can give the same with the restrictions and cautions necessary for the security and interests of the State and the efficiency of the traffic of the official stations.

ART. 13.—All the rules and regulations of the Department General of telegraphs shall apply to the service of radiotelegraphy with reference to the secrecy to telegrams and as to damages caused to the stations or their material.

ART. 14.—The Government will proceed in the terms of the legislation in force against those who, without permission, exploit, whether publicly or clandestinely, a radiotelegraphic service, and in time of the disturbance of public order or external war these offences shall be classified and punished in the first case as an act of resistance to constituted authority and in the last case as an act of spying.

ART. 15.—Those coastal and interior radiotelegraphic stations which are dependencies of the Ministry of Ways and Public Works, and not reserved for special purposes, will be open for public correspondence.

Sole Paragraph.—No responsibility will be accepted by the radiotelegraphic service for errors of the service or faulty delivery of telegrams, in the terms of Art. 41 of the regulations revised in London.

ART. 16.—Any Brazilian radiotelegraphic station, whether civil or military, terrestrial or marine, will be obliged to give preferential attention to calls for succour that are received by them.

ART. 17.—In all radiotelegraphic stations the public service shall have preference to private service, save in cases of *force majeure* (accidents and calls for succour).

ART. 18.—Whatever be the object for which radiotelegraphy be established the respective services shall be organised in a form not to cause disturbance to other radiotelegraphic stations, and the respective Ministries shall in all cases adopt provisions and rules necessary to such end.

ART. 19.—Radiotelegrams proceeding from a ship which flies a flag of a non-adherent country to the regulations upon radiotelegraphy of the Convention of London as well as those addressed to ships of such countries shall be transmitted by Brazilian stations only in cases where the respective country has previously declared that it will conform to those rules and regulations in the adjustment of accounts.

ART. 20.—When the Ministries of Marine or War have to establish radiotelegraphic stations for special ends in strategic points and fortified places, on land or sea, they will proceed in agreement with each other and with the Ministry of Ways and Public Works when choosing of the site and deciding upon the manner of carrying out the work, to the end that they shall not interfere with their mutual traffics.

These stations may be worked by telegraphists of the civil administration.

Whilst civil functionaries man the stations established in strategic or fortified places they shall be subject to military regime.

ART. 21.—All coastal radiotelegraph stations worked by the Department of General Telegraphs must receive and transmit meteorological observations, and there must be provided installations at one or more stations of the apparatus necessary to transmit time signals in the manner established by the Time Conference held in Paris in October, 1912.

Sole Paragraph.—The national ships provided with apparatus for wireless telegraphy and the foreign ships in the same condition can signal to the coast stations when they are within reach of them their observations about the weather, which will be communicated to the Meteorological Observatory of Rio de Janeiro and to the ships, on the other hand, will be communicated the observations from that Observatory.

ART. 22.—To the radiotelegraphic service of Brazil are applicable the International Radiotelegraphic Convention held in London and the rules which may be laid down for the execution of the present law.

ART. 23.—The adjustment of accounts shall be made six-monthly between the Department General of Telegraphs and the agencies of the companies of national and foreign ships, and in their absence with the administrations to which those ships are attached in accordance with what is established by Art. XLII. of the International Regulations (revised in London).

ART. 24.—The call letters of the stations on board the national war and merchant ships will be distributed by the Department of General Telegraphs in accordance with the series of indicators reserved for Brazil by the Secretary of the International Union of Telegraphs of Berne.

ART. 25.—The radiotelegraphic stations in the interior of the country shall be established and worked by the Department of General Telegraphs, organising proper radiotelegraphic districts in regions where there are none, connecting them with the telegraphic service by means of wired lines and working with a parallel service of wired telegraphs.

ART. 26.—Annuling all whatsoever acts in this connection effected by the Government prior to the promulgation of the present law.

ART. 27.—It shall be the sphere of the Ministry of Ways and Public Works to make provision for the establishment and initiation of an international radiotelegraphic service and with the adjoining countries as well as the drawing up of the basis of a definite agreement and referendum to the National Congress.

ART. 28.—All previous acts to the contrary are revoked.

DECREE NO. 3,316

(Extract from).

H Included in a Finance Bill, passed by Congress, signed and put into operation by the President of the Brazilian Republic on August 16th, 1917; we find a clause dealing with wireless telegraphy which authorises the Government to—

“Complete the services of Telegraphy, Radiotelegraphy, and “Telephony, to establish all the communications necessary for Military “and Naval service.”

The final clause of this same Act makes the following provision, which would appear likely to have some special reference to Decree No. 3296 of the 10th July, 1917: “Revoke all dispositions to the contrary.”

BRITISH EAST AFRICA

(See under EAST AFRICA PROTECTORATE (BRITISH), page 265, and UGANDA, page 494.)

BRITISH GUIANA

(See WEST INDIES (BRITISH), page 556.)

BRITISH HONDURAS

THE Crown Colony of British Honduras lies in Central America within $18^{\circ} 29' 5''$ to $15^{\circ} 53' 55''$ N. latitude and $89^{\circ} 9' 22''$ to $88^{\circ} 10'$ W. longitude. Its extreme length and breadth are 174 miles and 68 miles respectively; it abuts on the Atlantic, and is bounded on the north by Yucatan (Mexico), on the west and south by Guatemala, and on the east by the Caribbean Sea. The total area is about 8,598 square miles.

Wireless telegraphy has seen some developments here since its first introduction, and both the ownership and working of the radiotelegraphic stations are vested in the Government. The administration of wireless telegraphy is carried out under the following regulations:—

A.—Consolidated Law.

B.—Schedule.

WIRELESS Telegraphy in British Honduras is regulated by Chapter CXCIX. of the Consolidated Laws of British Honduras (revised edition), the text of which will be found below.

CHAPTER CXCIX. OF THE CONSOLIDATED LAWS OF BRITISH HONDURAS (REVISED EDITION).

TO REGULATE WIRELESS TELEGRAPHY.

A 1. *Interpretation.*—In this chapter “Wireless Telegraphy” means any system of communication by telegraph without the aid of any wire connecting the points from and at which the messages or other communications are sent or received: Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

2. *License to Instal, &c., Wireless Telegraphic Apparatus.*—(1) A person shall not establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place or on board any ship registered in the Colony except under and in accordance with a license granted in that behalf by the Governor.

(2) Every such license shall be in such form and for such period as the Governor may determine and shall contain the terms, conditions, and restrictions on and subject to which it is granted.

3. *Apparatus not to be worked on merchant ship except in accordance with regulations.*—A person shall not work any apparatus for wireless telegraphy installed on any merchant ship; whether British or Foreign, while that ship is in the territorial waters of the Colony, otherwise than in accordance with regulations under this chapter.

4. *Regulations.*—(1) The Governor may from time to time make regulations for carrying into effect the purposes of this chapter, and such regulations shall on publication in the *Gazette* have the same effect as if enacted in this chapter.

(2) The regulations in the schedule to this chapter shall have effect except in so far as they may be amended or rescinded by regulations made under the authority of this section.

(3) If at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy the use of wireless telegraphy on board merchant ships while in the territorial waters of the colony shall be subject to such further regulations as may be made by the Governor from time to time, and such regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

5. *Search Warrants.*—If a District Commissioner is satisfied by information on oath that there is reasonable ground for suspecting that a wireless telegraph station has been established without a license in that behalf or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship contrary to the provisions of this chapter or of any regulations made under this chapter, or of any license granted under this chapter, he may grant a search warrant to any police officer or any person appointed in that behalf by the Superintendent of Police and named in the warrant, and a warrant so granted shall authorise the police officer or person named therein to enter and inspect the station, place or ship and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

6. *Penalty for contravention of chapter.*—(1) Any person who shall offend against any provision of this chapter or any regulations made thereunder shall be liable on summary conviction for every such offence to a fine not exceeding two hundred and fifty dollars, and upon such conviction the Court may order that any apparatus for wireless telegraphy in connection with which the offence was committed shall be seized and forfeited.

(2) *Procedure.*—Proceedings shall be taken before the District Commissioner for the Belize District on the complaint of the Superintendent of Police or of any person thereto authorised by him in writing, and the procedure shall be the same as the procedure for the time being in force in respect of offences punishable on summary conviction.

SCHEDULE—Section 4 (2).

REGULATIONS.

B i. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the Colony shall be worked in such a way as not to interfere with

(a) Naval signalling, or

(b) the working of any wireless telegraph station lawfully established, installed or worked in the Colony or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

ii. In these regulations “Naval Signalling” means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty’s Navy, between ships of His Majesty’s Navy and Naval Stations, or between a ship of His Majesty’s Navy or a Naval Station and any other wireless telegraph station whether on shore or on any ship.

iii. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used while such ship is in any harbour or bay of the Colony except with the special or general permission of the Governor.

iv. For the purpose of any proceedings under these regulations the master or person being or appearing to be in command or charge of any ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.

v. Any summons or other document in any proceedings under these regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in command or charge of the ship.

vi. These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

BRITISH NORTH BORNEO

(See BORNEO (BRITISH NORTH), page 187.)

BRITISH WEST INDIES

. (See WEST INDIES (BRITISH), page 531.)

CANADA

THE Dominion of Canada possesses a land area of 3,603,910 miles. It was originally discovered by Cabot in 1497, then settled by the French in the seventeenth century, and finally annexed to the British Empire in 1763. Its establishment as a Dominion dates from July 1st, 1867. The executive power is vested in a Governor-General appointed by the sovereign and aided by a Privy Council.

According to the latest report of the Department of the Naval Service dated June 23rd, 1916, 142 radiotelegraphic stations are at work. These are classified as follows:—

Government Commercial Stations	..	..	1
Coast Stations	..	..	42
Government Ship Stations	..	..	24
Licensed Ship Stations	..	..	64
Public Commercial Stations	..	..	3
Private Commercial Stations	..	..	4
Radiotelegraph Training Schools	..	..	2
Licensed Experimental Stations	..	..	2
Total			142

At the commencement of the war all *Amateur Stations* in Canada were closed down. All *Wireless Societies* throughout the Dominion have also been disbanded since the outbreak of hostilities.

The following stations on the East Coast, formerly operated by the Marconi Wireless Telegraph Company, were taken over at various periods, and are now operated by the Department of the Naval Service:—Camperdown (Nova Scotia); North Sydney (Nova Scotia); Point Riche (Newfoundland); and Sable Island (Nova Scotia).

The Department requires that all those entering the Radiotelegraphic Service as operators should pass a proficiency examination to determine their qualifications prior to acceptance, and announces that applications for entry as operators in the Radiotelegraph Service should be addressed to—

“ The Deputy Minister,
Naval Service Department,
Ottawa.”

On account of “ the confidential nature of the messages passing “ through the hands of the radiotelegraph operators, and the secret “ instructions with which they must be entrusted during the present “ time,” it was considered advisable to enlist in the Royal Naval Canadian Volunteer Reserve all the wireless operators in the employment of the Department. For this purpose a special rank of wireless operator was instituted, and regulations were drawn up to meet the requirements in this connection. The operators have now been enlisted in the R.N.C.V.R.

The above-mentioned report also states that "in addition to its regular work the Radiotelegraph Service has on many occasions been instrumental in obtaining assistance for vessels in distress and in communicating instructions from their owners."

Radiotelegraphy in the Dominion was, until 1913, regulated by a section of the Telegraphs Act (see YEAR BOOK OF WIRELESS TELEGRAPHY AND TELEPHONY, 1913, pages 111 and 112). This is now replaced by the Act which was assented to on June 6th, 1913, printed in the following pages. As matters at present stand, we may usefully divide the rules governing the administration and procedure as far as wireless telegraphy is concerned into the following :—

A—The Radiotelegraphic Act, Chapter 43 of the 1913 Statute.

B—Regulations issued by the Governor-in-Council.

C—Regulations issued by the Minister of the Naval Service.

D—Ship Licence.

THE RADIOTELEGRAPH ACT.

PART IV.

1. This Act may be cited as *The Radiotelegraph Act*.

A 2. In this Act, unless the context otherwise requires—

(a) "Minister," means the Minister of the Naval Service ;

(b) "radiotelegraph" includes any wireless system for conveying electric signals or messages including radiotelephones ;

(c) "coast station" means any radiotelegraph station which is established on land or on board a ship permanently moored and which is used for the exchange of messages and electric signals with ships at sea ;

(d) "land station" means any radiotelegraph station or installation of radiotelegraphic apparatus which is not a coast station or a ship station ;

(e) "ship station" means any radiotelegraph station established on board a ship which is not permanently moored.

3. No person shall establish any radiotelegraph station or instal or work any radiotelegraph apparatus in any place in Canada or on board any ship registered in Canada except under and in accordance with a licence granted in that behalf by the Minister.

4. From and after the first day of January, nineteen hundred and fourteen, no passenger steamer, whether registered in Canada or not—

(a) licensed to carry 50 or more persons, including passengers and crew, and going on any voyage which is or which includes a voyage of more than 200 nautical miles from one port or place to another port or place ; or,

(b) licensed to carry 250 or more persons, including passengers and crew, and going on any voyage which is or which includes a voyage of more than 90 nautical miles from one port or place to another port or place ; or,

(c) licensed to carry 500 or more persons, including passengers and crew, and going on any voyage which is or which includes a voyage of more than 20 nautical miles from one port or place to another port or place,

shall leave or attempt to leave any Canadian port unless such steamer is equipped with an efficient radiotelegraph apparatus, in good working order, capable of transmitting and receiving messages over a distance at least one hundred nautical miles by night and by day, and in charge of a person fully qualified to take charge of and operate such apparatus.

(2) The owner, master or other person in charge of any passenger steamer which leaves or attempts to leave any Canadian port contrary to the provisions of this section shall, on summary conviction, be liable to a fine not exceeding \$1,000 and costs, and such fine and costs shall constitute a lien upon such passenger steamer.

(3) This section shall not apply to passenger steamers plying on the rivers of Canada, including the River St. Lawrence as far seaward as a line drawn from Father Point to Point Orient, or on the Northumberland Straits, or on the Georgian Bay, or on the lakes of Canada other than Lakes Ontario, Erie, Huron and Superior, and the provisions of paragraph (c) of subsection I. of this section shall not apply to steamers making voyages on Lakes Ontario, Erie, Huron and Superior, the regular route for which is not at any point more than seven miles from the shore.

(4) This section shall not apply to steamers calling at Canadian ports solely for the purpose of obtaining bunker coal or provisions for the use of such steamer, or through stress of weather, or for repairs.

5. All persons operating land or cable telegraph lines shall transmit all messages destined to or coming from ship stations via coast stations under such rules as may be made by the Board of Railway Commissioners for Canada.

6. No one shall be employed as a radiotelegraph operator at any coast or land station unless he is a British subject, and all radiotelegraph operators at shore or land stations, or on ship stations on board any vessel registered in Canada, shall take and subscribe a Declaration of Secrecy in the form set forth in the Schedule to this Act, before a judge of any court, a notary public, a justice of the peace or a commissioner for taking affidavits, having authority or jurisdiction within the place where the oath is administered.

(2) Every person who has made the Declaration of Secrecy and who, either directly or indirectly, divulges to any person, except when lawfully authorised or directed so to do, any information which he acquired by virtue of his employment, is guilty of an offence and shall be liable on summary conviction to a penalty not exceeding \$100 and to imprisonment for a term not exceeding six months.

7. Any person who sends or transmits or causes to be sent or transmitted any false or fraudulent distress signal, message, call or radiogram of any kind, or who without lawful excuse interferes with or obstructs any radio-communication, shall be guilty of an offence and shall be liable on summary conviction to a penalty not exceeding \$500 and costs or six months' imprisonment.

8. If a justice of the peace is satisfied by information on oath that there is reasonable ground for supposing that a radiotelegraph station has been established without licence in that behalf, or that any apparatus for radiotelegraphy has been installed or worked in any place

or on board any ship registered in Canada within his jurisdiction without a licence in that behalf, he may grant a search warrant to any police officer or any officer appointed in that behalf by the Minister and named in the warrant.

(2) A warrant so granted shall authorise the officer named therein to enter and inspect the station, place or ship and to seize any radiotelegraph apparatus which appears to him to be there used or intended to be there used for radiotelegraphy.

9. Everyone who establishes a radiotelegraph station or installs or works any radiotelegraph apparatus in violation of the provisions of this Act, or of any regulation made hereunder, shall be liable on summary conviction to a penalty not exceeding \$50, and on conviction on indictment to a fine not exceeding \$500 and to imprisonment for a term not exceeding twelve months, and in either case shall be liable to forfeit to His Majesty any radiotelegraph apparatus installed or worked without a licence.

(2) No proceedings shall be taken against any person under this section, except by order of the Minister.

10. The Governor-in-Council may—

(a) prescribe the tariff of fees to be paid for licences and for examination for certificates of proficiency held and issued under the provisions of this Act ;

(b) accede to any international convention in connection with radiotelegraphy, and make such regulations as may be necessary to carry out and make effective the terms of such convention and prescribe penalties recoverable on summary conviction for the violation of such regulations ; provided that such penalties shall not exceed \$500 and costs ;

(c) make regulations for the censorship and controlling of radiotelegraph signals and messages in case of actual or apprehended war, rebellion, riot or other emergency.

11. The Minister may make regulations—

(a) prescribing the form and manner in which applications for licences under this Act are to be made

(b) classifying ship, coast and land stations and prescribing the type and range of the regular equipment and the emergency equipment to be installed in the several classes of stations ;

(c) defining the different kinds of licences that may be issued, their respective forms and the several periods for which they shall continue in force ;

(d) prescribing the conditions and restrictions to which the several licences shall respectively be subject ;

(e) prescribing the different classes of certificate of proficiency and the class of certificate necessary to qualify persons as operators for the several classes of ship, coast and land stations ;

(f) for the examination of persons desiring to obtain certificates of proficiency as radiotelegraph operators and to determine the qualifications in respect of age, term of service, skill, character and otherwise to be required for such certificates ;

(g) prescribing the watches to be kept by operators and the number of operators to be maintained and kept at the different classes of ship, coast and land stations ;

(h) for the inspection of radiotelegraph stations ;

(i) to provide how radiotelegraph apparatus installed upon any foreign or British ship (whether such British ship is registered in Canada or elsewhere) shall be operated while such ship is within the territorial waters of Canada ;

(j) to compel all radiotelegraph stations to receive, accept, exchange and transmit signals and messages with such other radiotelegraph stations and in such manner as he may prescribe ;

(k) for the effective carrying out of the provisions of this Act.

(2) The Minister may, by regulation, authorise the imposition of a penalty not exceeding fifty dollars and costs or three months' imprisonment for the violation of any regulation made under this section, and any such penalty may be recovered upon summary conviction.

12. All regulations made under the provisions of the two sections immediately preceding shall be published in *The Canada Gazette*, and shall be laid before both Houses of Parliament within ten days after the publication thereof if Parliament is then sitting, and if Parliament is not then sitting, then within ten days after the next meeting thereof.

13. His Majesty may, at any time, assume, and for any length of time retain, possession of any radiograph station and of all things necessary to the sufficient working thereof, and may, for the same time, require the exclusive service of the operators and other persons employed in working the same ; and the person owning or controlling the station shall give up possession thereof, and the operators and other persons so employed shall, during the time of such possession, diligently and faithfully obey such orders, and transmit and receive such signals, calls and radiograms as they are required to receive and transmit by any duly authorised officer of the Government of Canada.

(2) If the Minister and the person owning or controlling any radiotelegraph station taken possession of by the Crown under the provisions of this section cannot agree as to the compensation to be paid by the Crown for such taking possession, the Minister shall refer the matter to the Exchequer Court of Canada for adjudication.

14. Part IV. of *The Telegraphs Act* is repealed.

SCHEDULE.

DECLARATION OF SECRECY.

I, A. B., solemnly and sincerely promise and declare that I will faithfully and honestly fulfil the duties which devolve upon me as radiotelegraphic operator, and that I will not, either directly or indirectly, divulge to any person, except when lawfully authorised or directed so to do, any information which I acquire by virtue of my employment as such operator, or which may come to my knowledge through the operation of any radiotelegraphic installation

Declared before me at.....
this.....day of....., 19....

[Signature of declarant.]

REGULATIONS.

ISSUED BY THE GOVERNOR IN COUNCIL.

B Approved by the Governor in Council and issued in accordance with Section 10 of the Radiotelegraphic Act, Chapter 43, Statutes 1913.

Paragraphs 1 and 2 deal with FEES for the Licences and Examinations. Paragraph 3 lays it down that:—

(1) Provisions of the International Radiotelegraph Convention of London, 1912, and of the regulations annexed thereto, shall be observed by all "coast stations" established in Canada, and by all "ship stations" on board any vessel registered in Canada.

(2) That any person who installs or works any Radiotelegraph Apparatus at any of the above-mentioned stations in violation of this regulation, shall be liable on summary conviction to a fine not exceeding five hundred dollars (\$500) and costs.

Paragraphs 4 and 5 deal with Control of Stations in the following terms:—

CONTROL OF STATIONS IN CASE OF EMERGENCY.

4. (i) *Coast and Land Stations.*—If, and whenever in the opinion of the Minister an emergency shall have arisen in which it is expedient for the public service that the Government shall have control over the transmission of messages by the apparatus of any coast or land station, it shall be lawful for the said Minister, by warrant under his hand, to direct and cause so much of the apparatus as is within Canada or the territorial waters thereof, or any part of the apparatus, to be taken possession of in the name and on behalf of His Majesty and to be used for His Majesty's Service and subject thereto for such ordinary services as to the said Minister may seem fit, and in that event, any person, authorised by the said Minister, may enter upon the stations, offices and works of any coast or land station or any of them and take possession thereof and use the same as aforesaid.

(ii) The Minister may, when he considers such an emergency as aforesaid to have arisen, instead of taking possession of such coast or land station, direct and authorise such persons as he may think fit to assume the control of the transmission of messages by the apparatus of such station, either wholly or partly and in such manner as he may direct, and such persons may enter upon the station premises accordingly, or the said Minister may direct the owner or his representative to submit to him or any person authorised by him all messages tendered for transmission or arriving by the apparatus or any class or classes of such messages, to stop or delay the transmission of any messages or deliver the same to him or his agent, and generally to obey all such directions with reference to the transmission of messages as the said Minister may prescribe, and the owner or his representative shall obey and conform to all such directions.

(iii) The Minister may, when he considers such emergency as aforesaid to have arisen, close any coast or land station and cause the removal therefrom of the apparatus or any part thereof.

5. (i) *Ship Stations*.—If, and whenever, in the opinion of the Minister, an emergency shall have arisen in which it is expedient for the Public Service that the Government shall have control over the transmission of messages by the apparatus of a radiotelegraph station on board any Canadian registered vessel, it shall be lawful for the said Minister, by warrant under his hand, to direct and cause the apparatus or any part thereof to be taken possession of in the name and on behalf of His Majesty and to be used for His Majesty's Service and, subject thereto, for such ordinary services as to the said Minister may seem fit, and in that event, any person authorised by the said Minister may enter upon any ship station and take possession thereof and use the same as aforesaid.

(ii) When the Minister considers such an emergency as aforesaid to have arisen, he may, instead of taking possession of such ship station, direct and authorise such persons as he may think fit to assume the control of the transmission of messages by the apparatus of such station, either wholly or partly, and in such manner as he may direct, and such persons may enter upon the station premises accordingly or the said Minister may direct the owner or his representative to submit to him or any person authorised by him all messages tendered for transmission or arriving by the apparatus or any class or classes of such messages, to stop or delay the transmission of any messages or deliver the same to him or his agent, and generally to obey all such directions with reference to the transmission of messages as the said Minister may prescribe, and the owner or his representative shall obey and conform to all such directions.

NAVAL MINISTER'S REGULATIONS.

Issued by the Minister of the Naval Service in accordance with Section 11 of the Radiotelegraphic Act, Chapter 43, Statutes 1913.

C *Paragraph 1* deals with application for LICENCES, which must be made to the Deputy Minister of the Naval Service, Ottawa, and *Paragraph 2* deals with the CLASSES OF LICENCES, which are subdivided into :—

1. Limited coast stations.
2. Public commercial stations.
3. Private commercial stations.
4. Experimental stations.
5. Amateur experimental stations.
6. Technical or training school stations.
7. Ship stations.

N.B.—(2) to (6) inclusive are known as the class of "land stations," (1) and (7) as "coast" and "ship" stations respectively.

Paragraph 3 deals with duration of licences, *paragraph 4* with limited coast licences and runs as follows :—

Limited coast licences will only be granted with respect to stations in localities not served by a regular Government coast station ; such stations will be allowed to undertake a limited correspondence with ships at sea determined by the object of such correspondence. They must exchange public messages with such ship, coast and land stations as are designated in the licence, but with no other stations whatsoever.

For ship to shore working they must be operated in accordance with the provisions of the International Radiotelegraph Convention, and they must employ such wave-lengths below 600 metres or above 1,600 metres as are specified in the licence.

The watches to be maintained and the number and class of operators to be carried are to be as specified in the licence, the regular form of which is annexed hereto.

(Forms N. W. 42.)

Paragraphs 5, 6 and 7 deal with the conditions appertaining to the issue of licences to land stations (see list in *Paragraph* 2, Nos. (2) and (6)).

Paragraphs 8 to 31 deal with Special Regulations for (a) Experimental and (b) Amateur Experimental Stations.

SPECIAL REGULATIONS FOR EXPERIMENTAL STATIONS.

8. Applicants for an experimental licence must state in their application what wave-length they desire to use; the following lengths being available:—

Below 200 metres.

“ 450 ”

Above 1,900 ”

In special cases and for short periods the Minister shall have power to permit the use of 300, 600 and 1,800 metres for the purpose of testing or demonstrating commercial apparatus, such permission to be given by letter under his hand.

9. The station is strictly limited to the use of such wave-length or wave-lengths as are specified in the licence.

10. When transmitting on wave-lengths of 100 metres or less the station must be worked by a person holding an amateur experimental certificate of proficiency (see Regulation No. 97), and when transmitting on wave-lengths greater than 100 metres it must, if it be within the range of any commercial or coast station, be worked by a person holding either a “first class,” “second class,” or “experimental” certificate of proficiency in radiotelegraphy. (See Regulations Nos. 93, 94 and 96).

11. The power used, measured at the terminals of the transformer, must not exceed $\frac{1}{2}$ k.w.

In special cases, however, such as that of a commercial company desirous of testing and demonstrating apparatus, or stations so far removed from any commercial station or route of navigation as to preclude any possibility of interference, the Minister may at his discretion permit the use of greater powers than $\frac{1}{2}$ k.w.

12. The waves emitted must be as little damped as possible, and in no case shall the logarithmic decrement of a complete oscillation exceed two-tenths. The coupling between the primary and secondary of the oscillation transformer shall not be closer than that which gives a difference of five per cent. between the mean wave-length and either of the two waves emitted by the coupled circuits.

13. A distinctive call signal will be allotted to each station, commencing with the letter “X,” e.g., XAA, XAB, which signal shall be sent not less than three times at the termination of every transmission.

14. The regulations of the International Radiotelegraph Convention must, where applicable, be observed at the station.

15. The station, when operating, must listen for the signal "STP," which will indicate that an experimental station is interfering with commercial business.

The latter signal will only be made use of by certain authorised Government stations and will not be used unless absolutely necessary. The signal "STP" will, whenever possible, be preceded by the call signal allotted to the experimental station to which the interference is attributed and will be followed by the call signal of the Government station. On receipt of the "STP" signal, experimental stations will absolutely cease to operate until the Government station gives the signal "Cancel STP."

16. The aerial must be connected to the transmitting apparatus only when actual communication is in progress or when measurements are being taken. At all other times, such as when the spark is being tested or sending is being practised the aerial must be disconnected.

17. When the licensed station is in the vicinity of a commercial station it should be connected with the local telephone exchange so that instant communication may be established in case of interference.

18. *Amateur Experimental Licences.*—Amateur experimental licences will be granted to small stations used for instruction, experimental purposes, or amusement by persons relatively inexperienced in operating.

In addition to the provisions contained in the regular form of amateur experimental licence annexed hereto (Form No. W. 44), the following special regulations will apply to all amateur experimental stations.

SPECIAL REGULATIONS FOR AMATEUR EXPERIMENTAL STATIONS.

19. At amateur experimental stations the power used measured at the terminals of the transformer, must not exceed $\frac{1}{2}$ k.w.

20. The wave-lengths which may be used vary with the distance between the licensed station and any commercial coast or land station or a route of navigation as follows :—

For Transmission—

Class 1.—Station located within 5 miles of a commercial coast or land station or a route of navigation, shall not use a transmitting wave-length greater than 50 metres ;

Class 2.—Stations located more than 5 but less than 25 miles from a commercial coast or land station or a route of navigation, shall not use a transmitting wave-length greater than 100 metres ;

Class 3.—Stations located more than 25 but less than 75 miles from a commercial coast or land station or route of navigation, shall not use a transmitting wave-length greater than 150 metres ;

Class 4.—Station located more than 75 miles from a commercial coast or land station or route of navigation, shall not use a transmitting wave-length greater than 200 metres.

21. In cases where transmitting apparatus is installed the natural wave-length of the aerial and the length of the emitted waves must be as specified in the licence; in general this wave-length will be the maximum allowable under Regulation No. 20.

22. In cases where no transmitting apparatus is installed on the station, no limit is placed on the length of the aerial which may be used provided it is employed for the purpose of reception only.

23. The station must be worked by a person holding an amateur experimental certificate of proficiency (see Regulation No. 97).

24. The waves emitted must be as little damped as possible, and in no case shall the logarithmic decrement of a complete oscillation exceed two-tenths. The coupling between the primary and secondary of the oscillation transformer shall not be closer than that which gives a difference of 5 per cent. between the mean wave-length and either of the two waves emitted by the coupled circuits.

25. A distinctive call signal will be allotted to each station commencing with the letter "X," e.g., XAA, XAB, which signal must be sent not less than three times at the termination of every transmission.

26. The regulations of the International Radiotelegraph Convention must, where applicable, be observed by the station.

27. The station must take every precaution to prevent interference with the working of other stations.

28. The station, when operating, must listen for the signal "STP" which will indicate that an amateur experimental station is interfering with commercial business.

29. The latter signal will only be made use of by certain authorised Government stations and will not be used unless absolutely necessary. The signal "STP" will, whenever possible, be preceded by the call signal allotted to the amateur experimental station to which the interference is attributed and will be followed by the call signal of the Government station. On receipt of the "STP" signal, all amateur experimental stations will cease to operate until the Government station gives the signal "Cancel STP."

30. The aerial must be connected to the transmitting apparatus only when actual communication is in progress or when measurements are being taken. At all other times, such as when the spark is being tested or sending is being practised the aerial must be disconnected.

31. When the licensed station is in the vicinity of a commercial station it should be connected with the local telephone exchange so that instant communication may be established in case of interference.

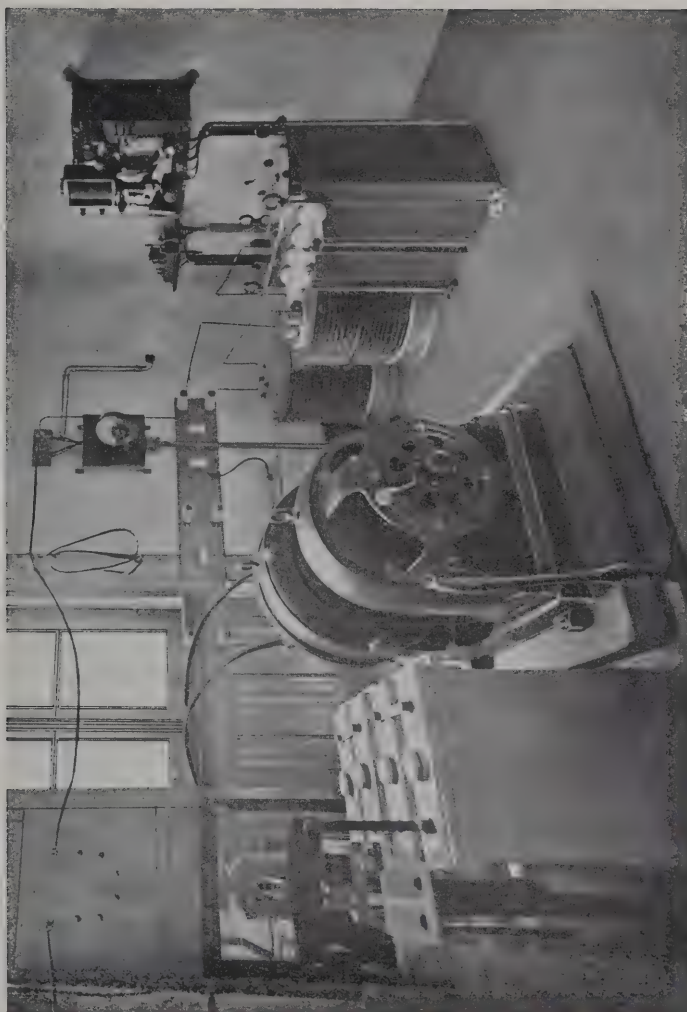
Paragraph 32 deals with Technical and Training-School Licences granted to stations intended for educational purposes.

Paragraph 33 deals with SHIP STATION LICENCES which "will be granted to stations on British ships registered in Canada."

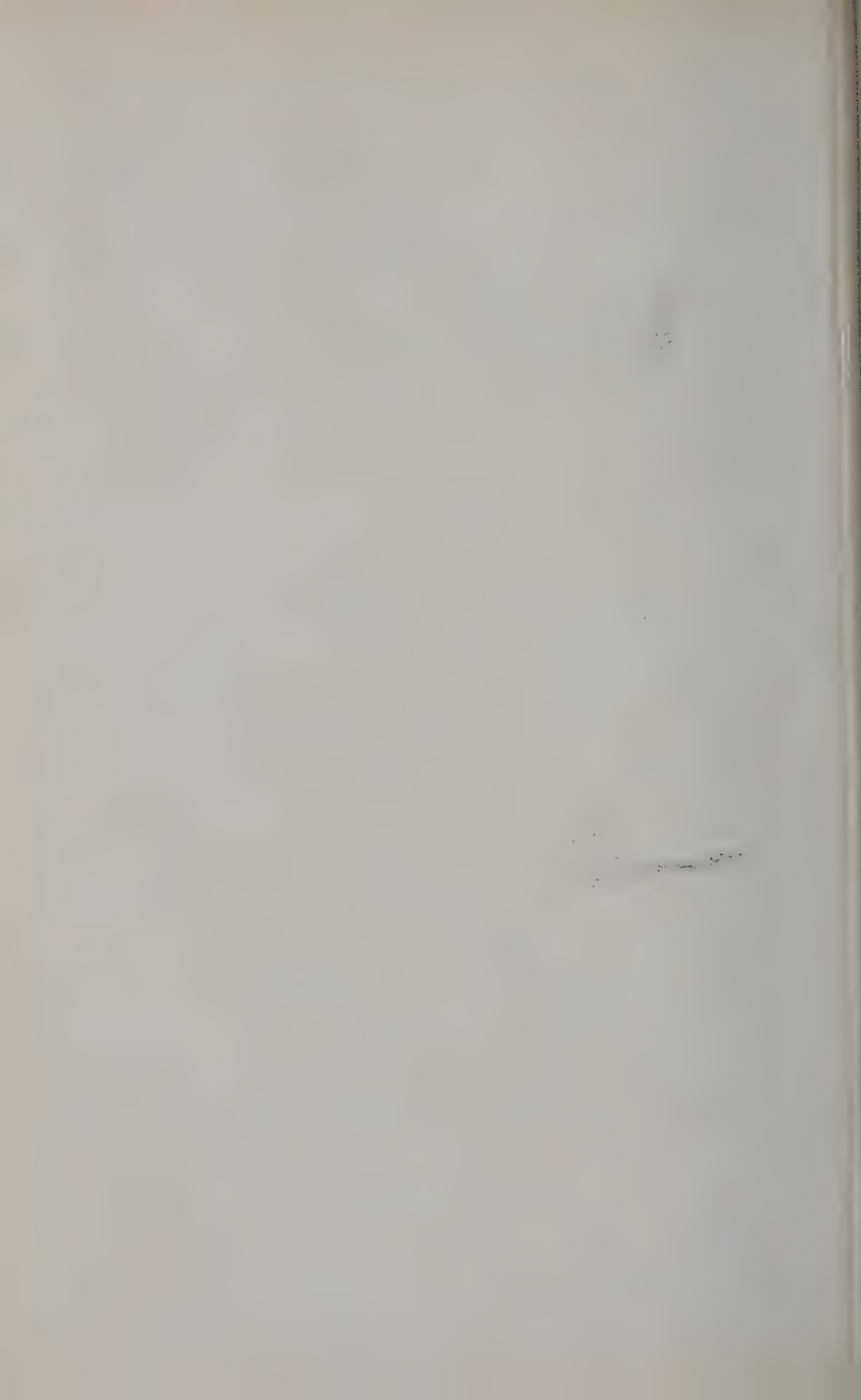
Paragraphs 34 to 36 deal with the CLASSIFICATION OF SHIP STATIONS, and run as follows:—

CLASSIFICATION OF SHIP STATIONS. .

34. *Class 1.*—All "sea-going" passenger vessels registered in Canada with an average speed of 15 knots or more, carrying 50 or more persons and plying between ports more than 200 miles apart; also



NEW PORTUGUESE WIRELESS STATION AT LEIXOES (OPORTO) : THE TRANSMITTING APPARATUS.



all "sea-going" passenger vessels registered in Canada with an average speed of 13 knots or more, carrying 200 or more persons and plying between ports more than 500 miles apart.

35. *Class 2a.*—All "sea-going" passenger vessels registered in Canada affected by the provisions of Section 4 of the Radiotelegraph Act, which do not come under Class 1.

Class 2b.—All vessels registered in Canada plying on "coasting voyages" or on the "inland waters" of Canada which are affected by the provisions of Section 4 of The Radiotelegraph Act.

36. *Class 3.*—All vessels registered in Canada not affected by the provisions of Section 4 of The Radiotelegraph Act, but which have been voluntarily equipped with radiotelegraph apparatus.

The terms "sea-going," "coasting voyage," and "inland waters" are to be as defined in Section 72 of The Canada Shipping Act, Chapter 113, R.S., 1906.

REGULAR EQUIPMENT.

37. *Vessels in Class 1.*—The regular radiotelegraph equipment must have a minimum range of 100 nautical miles at all hours of the day and night with a similar equipment on a similar vessel and with all Canadian Government coast stations.

38. The normal wave-length of the emitted wave must be 600 metres; in addition the set must be capable of being operated on a wave-length of 300 metres, and means are to be provided whereby a quick change-over from one wave-length to the other may be effected.

39. In the case of small vessels on which it is materially impossible to use a transmitting wave-length of 600 metres, 300 metres may be employed; such ship stations, however, must be fitted with a receiver capable of tuning up to a 600 metre wave-length and the watches must be maintained on that wave-length.

40. The logarithmic decrement of a complete oscillation must not exceed two-tenths (0.2).

41. The power used by the transmitter, measured at the terminals of the generator of the station, must not, under normal circumstances, exceed 1 k.w., except in the special case provided for in article 35, paragraph 2, of the International Radiotelegraph Convention of London, 1912.

42. In the case of equipments using a power of more than 50 watts, an arrangement must be provided whereby several ranges, each less than the normal range, may be speedily obtained, the shortest range being, approximately, 15 nautical miles.

43. The use of "plain aerial" except in cases of distress or in installations using a power of less than 50 watts, is prohibited.

44. *Vessels in Class 2.*—Regulations No. 37 to No. 43, inclusive, shall apply to the equipments on vessels in Classes 2a and 2b.

45. *Vessels in Class 3.*—Regulations No. 38 to No. 43, inclusive, shall apply to equipments on vessels in Class 3.

EMERGENCY EQUIPMENTS.

46. *Class 1.*—Every vessel in Class 1 must carry an emergency source of power, instantly available, which shall be capable of operating the equipment for six hours, under normal conditions, with a minimum range of 80 nautical miles.

47. *Class 2.*—Vessels in Classes 2a and 2b must carry a similar source of power with the exception that the minimum normal range of the equipment is reduced to 50 nautical miles.

48. *Class 3.*—Vessels in Class 3 will not be required to carry emergency sets.

49. *Emergency, Equipments Generally.*—(1) The emergency equipment in its entirety, must in all cases be placed in the upper part of the ship, as high as practicably possible and in a position of the greatest safety.

(2) The emergency equipment may take the form of complete transmitter. Storage battery sets, of sufficient capacity to operate the regular radiotelegraph equipment of the vessel for the specified time, are, however, strongly recommended.

(3) A plain aerial transmitter may be installed as an emergency equipment, provided (subject to the provisions of Regulation No. 43) the use of the same is confined exclusively to distress calls.

(4) Regulations No. 46 to No. 49, inclusive, will become effective on and after December 1st, 1914.

50. *Spare Parts.*—Every ship station shall carry a reasonable number of spares of such parts of both the main and emergency radiotelegraph equipment as are subject to undue wear, deterioration, or liability to accident.

51. *Certificate of Inspection.*—The radiotelegraph installation on all British vessels registered in Canada will be subject to inspection by an officer of the Department of the Naval Service at least once a year, who, if the apparatus is found to comply with the terms of The Radiotelegraph Act and the regulations issued thereunder, shall issue to the vessel a "Radiotelegraph Inspection Certificate" certifying that the equipment has been duly inspected and that it complies with the provisions of the licence issued therefore by the Minister of the Naval Service, such certificate to be posted in the radiotelegraph cabin.

52. *Time.*—Radiotelegraph stations on vessels plying on the West Coast shall observe Pacific time, and those on the Great Lakes and East Coast Eastern Standard time.

WATCHES.

53. *Vessels in Class 1.*—A constant watch must be maintained at the radiotelegraph stations on all vessels in Class 1 (Regulation No. 34) whilst they are en route, and two operators, holding first-class certificates must be carried on such vessels.

54. *Vessels in Class 2a.*—A constant watch from 8 a.m. to 3 p.m. and a watch during the first ten minutes of every other hour of the day must be maintained at the radiotelegraph stations on all vessels in Class 2a (Regulation No. 35) whilst they are en route; the ten minute watch may be maintained by an operator holding a "Second-class

Certificate of Proficiency," or by a person holding a regular "Third-class Certificate."

55. *Vessels in Class 2b*.—Watches as hereinafter specified in Regulations No. 57 to No. 67, must be maintained at the radiotelegraph stations on all vessels in Class 2b, whilst they are en route.

56. *Vessels in Class 3*.—No fixed watches need be maintained at radiotelegraph stations on vessels in Class 3 (Regulation No. 36).

PACIFIC COAST.

57. *Class 2b—Local Coasting Runs*.—Vessels in Class 2b, when plying on ferry or local runs between any ports in British Columbia south of Queen Charlotte Sound or between any ports in the above province north of that Sound and not steaming for more than 16 hours in any day, must, whilst en route, maintain watches during the following periods :—

7.30 a.m. to 8.00 a.m. and the last half hour of every hour until 8.00 p.m.

9.30 p.m. to 10.00 p.m.

11.30 p.m. to 12.00 midnight.

3.30 a.m. to 4.00 a.m.

5.30 a.m. to 6.00 a.m.

In the case of vessels affected by Sub-section (c) of Section 4 of The Radiotelegraph Act (500 persons—ports more than 20 miles apart), the above watches need only be kept whilst the boats are en route between ports more than 20 miles apart.

58. *Vessels in Class 2b*, when plying on ferry or local runs between any ports in British Columbia south of Queen Charlotte Sound or between any ports in the above province north of that Sound and steaming for more than 16 hours in any one day, must, whilst en route, maintain watches as prescribed in Regulation No. 57, with the exception that a watch may be maintained from 1.30 a.m. to 2.00 a.m. instead of from 3.30 a.m. to 4.00 a.m., and no watch need be kept between the hours of 2.00 a.m. and 9.30 a.m.

59. *Class 2b—Coasting Vessels Plying North and South*.—Vessels in Class 2b plying on runs between ports in British Columbia south of Queen Charlotte Sound, and ports in the same province, north of that Sound, or vice versa, must, whilst en route, maintain watches during the following periods :—

7.30 a.m. to 8.00 a.m.

10.30 a.m. to 11.00 a.m.

1.30 p.m. to 2.00 p.m.

4.30 p.m. to 5.00 p.m.

7.30 p.m. to 8.00 p.m.

10.30 p.m. to 11.00 p.m.

If, during these periods, the vessel is in the immediate vicinity of any place mentioned in the lists given in Regulations 60 and 61, communication must be established with the coast station shown, or should the vessel reach such vicinity out of the above periods the ship station must call such coast station until communication is established or it become out of range.

60. *North bound :—*

Station.	LOCALITY.	
	Day Time. Between 7.30 a.m. and 11 p.m.	Night Time. Between 11 p.m. and 7.30 a.m.
Gonzales Hill ...	Trial Island	Trial Island.
Point Grey	The First Narrows or Abeam Porlier Pass.	The First Narrows or Abeam Porlier Pass.
Cape Lazo	Abeam	Abeam .
Alert Bay	Cape Mudge	Cape Mudge.
"	Blinkensop Bay	Blinkensop Bay.
"	Abeam	Abeam .
"	Pine Island... ..	Pine Island.
Triangle Island	Egg Island	Egg Island.
"	Before reaching Harold Point.	Before reaching Harold Point.
"	Ivory Island	Ivory Island.
"	Vancouver Rock	Vancouver Rock.
Digby Island	Watson Rock	Watson Rock.
"	Abeam	Abeam.
"	"	"
"	Hodgson Island	Hodgson Island.
"	Pointers	Pointers.

61. *South bound :—*

Station.	LOCALITY.	
	Day Time. Between 7.30 a.m. and 11 p.m.	Night Time. Between 11 p.m. and 7.30 a.m.
Digby Island	Pointers	Pointers.
"	Hodgson Island	Hodgson Island.
"	Abeam	Abeam.
"	"	"
"	Lawyer Island	Lawyer Island.
Triangle Island	Vancouver Rock	Vancouver Rock.
"	Ivory Island	Ivory Island.
"	Harold Point	Harold Point.
"	Egg Island	Egg Island.
"	Pine Island... ..	Pine Island.
Alert Bay	"	"
"	Abeam	Abeam.
"	Blinkensop Bay	Blinkensop Bay.
Cape Lazo	Chatham Point	Chatham Point.
"	Abeam	Abeam.
Point Grey	Sisters	Sisters
"	Abeam	Abeam.
Gonzales Hill	Active Pass	Active Pass.

Paragraphs 62 to 67 deal with SPECIAL REGULATIONS for vessels plying on the GREAT LAKES and the EAST COAST, whilst

in paragraph 68 we return to the general regulations affecting "operation," which run as follows:—

OPERATION.

68. *Power Available.*—Power for the operation of the main equipment shall be available during the periods a watch is being maintained under Regulations No. 53 to No. 67.

69. *Control of Ship Stations.*—The operation of the radiotelegraph station on any vessel shall be under the supreme control of the master of such vessel.

70. *Censorship by the Master of a Vessel.*—The master of a vessel shall have the right to censor all messages addressed to or transmitted by a radiotelegraph station on board his vessel, but such master shall not divulge to any person (other than the properly authorised officials of the Government or a competent legal tribunal), or make any use whatever of any message coming to his knowledge through the exercise of such censorship, nor shall the master or any operator divulge to any person (other than the properly authorised officials of the Government or a competent legal tribunal), or make any use whatever of any message (other than a message of distress) coming to his knowledge and not intended for the said station.

71. *Form W. 40.*—A copy of Form W. 40 must be posted in every radiotelegraph station; these forms may be obtained from the Deputy Minister of the Naval Service on request.

72. *Secrecy of Messages.*—No message shall be delivered, or its contents divulged, to any person except the addressee, his or her accredited agent, or such properly authorised persons as are essential for the forwarding of such message to its destination.

73. *Superfluous Signals.*—The transmission of superfluous signals by any ship or coast station is absolutely prohibited; trials and practices are forbidden except under such circumstances as to preclude the possibility of interference with other stations.

74. *Profane Language.*—No person shall transmit or make a signal containing profane words or language.

OPERATORS.

75. *Operators.*—Except in cases of emergency or distress the apparatus of all coast, land or ship stations must only be worked by persons holding regular Certificates of Proficiency in Radiotelegraphy, and who have subscribed to a Declaration of Secrecy, as prescribed in Section 6 of The Radiotelegraph Act.

76. *British Subjects.*—All operators on coast, ship or land stations must (subject to the provisions of Regulation No. 88b) be British subjects, and the different classes of stations must be worked by operators holding Canadian "Certificates of Proficiency" (subject to the provisions of Section 77) not inferior to those hereinafter specified in Regulations No. 80 to No. 86, for the respective classes of stations.

77. *Ship Stations.*—The holders of Certificates of Proficiency in Radiotelegraphy issued in accordance with the provisions of the International Radiotelegraph Convention by His Majesty's Postmaster-

General, the Administration of any British self-governing Dominion or Colony, or the Government of India, will (subject to the provisions of these regulations) be entitled to act as radiotelegraph operators on any Canadian vessels.

78. *Certificates of Proficiency.*—The following Certificates of Proficiency in Radiotelegraphy are issued by the Department :—

Ship Stations—

- (1) First-class Certificate.
- (2) Second-class Certificate.
- (3) Third-class (Watcher's) Certificate.

Land and Coast Stations—

- (4) Extra First-class Certificate.
- (5) First-class Certificate.
- (6) Second-class Certificate.
- (7) Third-class (Watcher's) Certificate.
- (8) Experimental Certificate.
- (9) Amateur Experimental Certificate.

79. *Emergency Certificates.*—In cases of emergency, when it is not possible to hold an examination, the Minister shall have power to issue "Emergency Certificates" of any class, valid for not more than six months, provided satisfactory proof is forthcoming that the operator has the necessary qualifications for the position.

The holders of such Emergency Certificates must attend a regular examination, when the first opportunity occurs, and the said certificate will automatically expire on the day on which the result of such examination is published.

OPERATORS TO BE CARRIED.

80. *Ships in Class 1.*—Ships in Class 1 must carry two operators holding First-class Certificates.

81. *Ships in Class 2a.*—Ships in Class 2a must carry two operators, one First-class and one Second-class, or one First-class and one Third-class.

82. *Ships in Class 2b.*—Ships in Class 2b must carry one First-class operator.

83. *Ships in Class 3.*—Ships in Class 3, if they undertake public correspondence, must carry one First-class operator or, if their service is limited exclusively to the ship's business, one Second-class operator.

84. *Coast Stations.*—(1) All public coast stations open for public correspondence and maintaining a constant watch must carry three operators, each of whom must hold a Canadian First-class Certificate of Proficiency. The Minister shall, however, have power in special cases to permit the employment of other persons on such stations for the purpose of maintaining the constant watch above mentioned, provided such persons are capable of transmitting and receiving in the Morse Code at a speed of twenty words a minute as prescribed in subsections (a) and (b) of Regulation No. 89 and provided the station is in charge of an operator holding a First-class Certificate of Proficiency.

(2) This regulation will become effective on and after the 1st of January, 1915.

85. All other coast stations shall carry such operators holding such certificates as are specified in the licence issued for the station under Regulation No. 4.

86. *Land Stations.*—Land stations (commercial, experimental, etc.) shall carry such operators holding such certificates as are specified in the licence issued for the station under Regulations Nos. 5, 6, 7, 18 or 32, according to the classification of the station.

87. *Applications.*—Applications for permission to attend examinations for any certificate of proficiency must be made to the Deputy Minister of the Naval Service on the special form provided for that purpose (W. 13). The date and place of examination will be notified to the candidate as soon as possible after receipt of the application.

88.* (a) No person shall be permitted to attend examination for any class of certificate of proficiency in radiotelegraphy—

- (1) Who is not a British subject.
- (2) Who has at any time been of enemy nationality.
- (3) Whose parents were not of British nationality at the time of his birth.
- (4) Whose parents have at any time been of enemy nationality.

(b) Candidates for examination for first-class certificates of proficiency must be not less than eighteen years of age.

(c) This regulation shall take effect on the 15th October, 1916, and shall remain in force until the cessation of hostilities, unless sooner repealed.

Paragraphs 89 to 101 (inclusive) deal with examinations for the various classes of certificates.

Paragraph 102 treats of the INSPECTION OF STATIONS and runs as follows:—

“Any duly authorised officer of the department may, from time to time, and at all reasonable times, enter upon any coast, land or ship station, within the jurisdiction of Canada, for the purpose of inspection, and may inspect any apparatus fixed or in use in such station, for the purpose of sending and receiving messages by radiotelegraphy and all other telegraphic instruments and apparatus fixed or being in such station, also the working and user of such apparatus and telegraphic instruments, and all books and papers used in connection with the operation of such station. His authority will be in the form of a letter signed by the Deputy Minister of the Department of the Naval Service.”

Paragraphs 103 and 104 deal with the Operation of Ship Stations within the Territorial Waters or Harbours of Canada, and run (after having been amended by special circular of August 15th, 1914) as follows:—

103. The Radiotelegraph Stations on board ships (other than H.M. ships of war or Canadian Government vessels) shall not be worked while such ships are within the Territorial Waters of Canada, unless specific permission is granted therefor by the controlling Canadian coast stations for the locality, and then only provided such working does

* As amended January 23rd, 1917.

not interfere with the operation of any coast station established in Canada, and that the provisions of the Radiotelegraph Convention of London, 1912, and the Service Regulations, annexed thereto, are strictly observed.

104.* (a) The Radiotelegraph Stations on board ships (other than H.M. ships of war or Canadian Government vessels) *shall not be worked whilst such ships are within a harbour of the Dominion of Canada.*

(b) For the proper enforcement of the above, *ships of British register in Canadian harbours must completely disconnect their aerial wires from their radio apparatus*, the ends of such wires being suspended entirely clear of the radiotelegraph cabin, preferably from the main rigging, *in such a manner as to show they are properly disconnected.*

(c) *Ships of foreign register in a Canadian harbour must* (subject to the provisions of the following subsection *d*) *take down their aerial wires completely* and disconnect the same from their radiotelegraph apparatus.

(d) Ships of foreign register remaining in a Canadian harbour for *less than thirty-six hours*, *may at the discretion of the competent naval authority*, be permitted to leave their aerials up, provided the same are disconnected in accordance with the provisions of subsection (b) of this regulation.

(e) Subsections (b), (c), and (d) of this regulation, relative to the disconnection of aerials in ships lying in Canadian harbours will not, until further notice, apply to Canadian or British vessels in Canadian harbours on the Great Lakes. Such vessels must, nevertheless, strictly observe the provisions of subsection (a).

105. *Penalty.*—Any person who violates any of the provisions of these regulations shall be liable on summary conviction to a penalty not exceeding fifty dollars and costs or three months' imprisonment.

Paragraph 106 (specially issued in supplementary circular dated January 20th, 1916) deals with the WAVE-LENGTHS to be used by SHIP STATIONS as follows:

All Canadian Licensed Ship Stations shall use the wave-length of 600 metres exclusively during the period of hostilities.

* * * * *

Separate forms of licence are issued for Limited Coast Stations, Public Commercial Stations, Private Commercial Stations, Experimental Stations, and Amateur Experimental, and the forms of each will be found in the copy of the Radiotelegraphic Act and Regulations printed at Ottawa in 1914, from which the above particulars have been extracted.

SHIP LICENCE.

The herein-named, resident of
D hereinafter called the licensee, is hereby licensed to establish and operate a radiotelegraph station on board the vessel for the term of one year commencing and terminating on, and to instal and operate at such station the apparatus mentioned in the schedule hereto, on payment of the sum of one dollar, being the licence fee for the privilege above-named.

This licence is subject to the following terms, conditions and restrictions :

1. In this licence the following words and expressions shall have the several meanings hereinafter assigned to them unless there be something, either in the subject or context, repugnant to such construction, that is to say:

The expression "marine signalling" means signalling by means of any system of wireless telegraphy between two or more ships, between ships and shore stations and any other wireless telegraph station, or between shore stations and ships; and the term "Minister" means the Minister or the Deputy Minister of the Naval Service for the time being.

2. (1) The licensee shall not establish, instal or operate any apparatus for wireless telegraphy, except the apparatus hereinafter called the "licensed apparatus" specified in the said schedule hereto.

(2) No tolls, fees or other consideration shall be received, levied or collected by the licensee until the same have been approved of by the Board of Railway Commissioners.

3. (1) The licensee shall so operate the licensed apparatus as not to interfere with the working of any wireless telegraph station established in Canada, or with marine signalling on the waters or territory of Canada or neighbouring waters or territory.

(2) With a view to preventing such interference as aforesaid, the licensee shall comply with all directions which shall be given to the licensee by the Minister and with all rules prescribed by the Minister for observance by his licensees :—

(a) With respect to all arrangements to be adopted for the purposes of syntomy or enabling the messages exchanged by means of the licensed apparatus to be distinguished from those emanating from any other wireless telegraph station ;

(b) With respect to any alteration of messages which the Minister may think necessary ; and

(c) Generally with respect to avoiding interference between one wireless telegraph station and another.

(3) The licensed apparatus shall not, without the consent of the Minister, be altered or modified in respect of any of the particulars mentioned in the schedule hereto.

4. (1) The licensee shall, if so required in writing by the Minister, cease to operate the licensed apparatus for such period (not exceeding hours in any one day) as may be specified by the Minister.

5. Subject to the provisions of the licence, and in accordance with the regulations issued from time to time by the Minister, the licensee shall transmit and receive messages by means of the licensed apparatus to and from any coast station or to and from any other ship without regard to the particular system of wireless telegraphy installed at such coast station or such other ship, on equal terms without favour or preference, whether as regards rates of charge, order of transmission or otherwise.

6. The licensee shall not be obliged to transmit and receive commercial messages by means of the licensed apparatus to and from a ship station on a ship registered in a country which does not adhere to the International Radiotelegraphic Convention, unless instructed so to do by the Minister in his regulations.

7. (1) If and whenever any department of the Government shall require the licensee, his servants or agents to transmit by means of the licensed apparatus any messages on His Majesty's service (including messages to and from ships of His Majesty's Royal Navy or Canadian Government vessels), such messages shall have priority over all other messages, and the licensee, his servants and agents shall, as soon as reasonably may be, transmit the same, and shall, until transmission thereof, suspend transmission of all other messages; and the rates to be charged on such messages shall not exceed half the rates charged the ordinary public.

(2) The licensee shall not be entitled to claim any compensation in respect of the suspension of the transmission of messages as aforesaid.

8. The licensee shall, so far as possible, receive from all other stations all requests for assistance and all signals of distress, and retransmit them with the least possible delay to the proper authorities by means of the licensed apparatus or any other means in his power.

9. The licensee shall not divulge to any person (other than properly authorised officials of the Government or a competent legal tribunal) or make any use whatever of any message coming to the knowledge of the licensee and transmitted by marine signalling or by any system of wireless telegraphy.

10. All messages transmitted by means of the licensed apparatus shall be copied in full in registers to be kept by the licensee for that purpose, and in such registers each of such messages shall be accompanied by its identifying number and date and full particulars of its places of origin and ultimate destination and such further particulars as the Minister shall from time to time reasonably require to be shown, messages on His Majesty's service being in such registers distinguished from other messages. The licensee shall preserve all used message forms, written and printed, and transcripts of messages and all other papers for such periods as is from time to time prescribed by the regulations of the International Radiotelegraphic Convention, and such registers and message papers shall be open to the inspection of the Minister or his officers thereto authorised at the head office of the licensee, in Montreal between the hours of 10 a.m. and 5 p.m., on every day except Sunday or a public holiday.

11. The Minister or his officers may from time to time and at all reasonable times enter upon the herein licensed station for the purpose of inspection, and may inspect any apparatus fixed or in use in such station for the purpose of sending and receiving messages by wireless telegraphy and all other telegraphic instruments and apparatus fixed or being in such stations, and the working and user of such apparatus and telegraphic instruments.

12. The licensee shall prepare a detailed return of the messages handled by the licensed station during each month on the forms provided for that purpose by the Minister, and shall forward the same to the Minister at the end of each month.

13. (1) The licensee shall observe at the said station the provisions of the International Radiotelegraphic Convention as adhered to by His Majesty in respect of the Dominion of Canada and the detailed regulations from time to time made thereunder for carrying such provisions into effect.

(2) The licensee shall operate the licensed apparatus in accordance with any regulations which may be issued from time to time by the Minister.

14. Except with the consent in writing of the Minister, the licensee shall not assign or sublet the licence.

15. The licensed apparatus at the said ship station shall be worked only by a person or persons holding a certificate or certificates issued by the Minister.

Certificates shall be granted to persons of such technical proficiency and shall be in such form and subject to such conditions as the Minister may from time to time prescribe.

16. The licensee shall carry this licence on the ship on which the ship station is established under this licence, and also such documents as may be prescribed by the Minister, for the purpose of enabling the licensee to communicate with coast stations in accordance with the rules and regulations of the International Radiotelegraphic Convention of Berlin, 1906.

17. If, and whenever, in the opinion of the Minister or any officer in command of one of His Majesty's ships of war, an emergency shall have arisen in which it is expedient for the public service that the Government shall have control over the transmission of messages by the licensed apparatus, it shall be lawful for the said Minister or officer, by warrant under his hand, to direct and cause the licensed apparatus or any part thereof to be taken possession of in the name and on behalf of His Majesty and to be used for His Majesty's service and, subject thereto, for such ordinary service as to the said Minister or officer may seem fit, and in that event, any person authorised by the said Minister or officer may enter upon the stations of the licensee and take possession thereof and use the same as aforesaid.

(2) The Minister or any officer in command of one of His Majesty's ships of war may when he considers such an emergency as aforesaid to have arisen, instead of taking possession of the stations of the licensee, direct and authorise such persons as he may think fit to assume the control of the transmission of messages by the licensed apparatus, either wholly or partly and in such manner as he may direct, and such persons may enter upon the licensee's premises accordingly, or the said Minister or officer may direct the licensee to submit to him or any person authorised by him all messages tendered for transmission or arriving by the licensed apparatus or any class or classes of such messages, to stop or delay the transmission of any messages or deliver the same to him or his agent and generally to obey all such directions with reference to the transmission of messages as the said Minister or officer may prescribe, and the licensee shall obey and conform to all such directions.

(3) In any case such as aforesaid, if the licensee shows that during the exercise of any of the powers aforesaid, his receipts for the licensed apparatus with respect to which the said powers have been exercised

have been less than his receipts from the same source during a corresponding period, the Government shall pay to the licensee, as compensation for any loss of profit sustained by the licensee by reason of the exercise by the Minister of any of the powers hereby reserved, such sum as may be settled between the Minister and the licensee by agreement or as in case of difference may be determined by arbitration. Provided always that no compensation as aforesaid shall be paid if not so far as the powers hereby reserved to the Minister are exercised for the purpose of preventing direct communication with any of His Majesty's enemies, and, save with the consent of the Minister no such compensation shall be paid if not so far as the powers aforesaid are exercised for the purpose of preventing direct or suspected communication with any of His Majesty's enemies or of protecting the interests of His Majesty under the apprehension of impending war.

18. In case of any breach, non-observance or non-performance by or on the part of the licensee of any of the terms or conditions herein contained and on the part of the licensee to be observed and performed, then and in any such case the Minister may, by writing, revoke and determine these presents and the licences, powers and authorities hereinbefore granted, and thereupon these presents, and the said licences, powers and authorities and each and every of them shall absolutely cease, determine and become void.

19. Nothing in these presents contained shall prejudice or affect the right of the Minister, from time to time, to establish, extend, maintain and work any system or systems of wireless telegraphic communication (whether of a like nature to that hereby licensed or otherwise) in such manner as he shall in his discretion think fit, neither shall anything herein contained prejudice or affect the right of the Minister, from time to time, to enter into agreements for or to grant licences relative to the working and user of wireless telegraphs (whether of a like nature to those hereby licensed or otherwise) for the transmission of messages in any part of Canada, by means of wireless telegraphy, with or to any person or persons whomsoever upon such terms as he shall, in his discretion, think fit.

20. Any notice, request or consent (whether expressed to be in writing or not) to be given by the Minister under these presents may be under the hand of any authorised officer for the time being of the Department of the Naval Service, and may be served by sending the same by registered letter to the licensee, and any notice to be given by the licensee, under these presents, may be served by sending the same by registered letter addressed to the Deputy Minister of the Naval Service, Ottawa, Ontario.

CEYLON

This British Colony, lying S.E. of Hindustan (latitude $5^{\circ} 53.5'$ to $9^{\circ} 50'$ N. ; longitude $79^{\circ} 48'$ to $81^{\circ} 52'$ E.), possesses a written history dating from 543 B.C., and the Portuguese were the first of European nations to fix a permanent settlement in the Island ; this occurred in A.D 1517. The Portuguese gave place to the Dutch in 1658, and the latter surrendered Ceylon to the British in 1796, possession being

confirmed by treaty in 1802. The Island is administered by a Governor aided by an Executive Council of seven and a Legislative Council of twenty-one members.

The erection of a Wireless Station for Ceylon was sanctioned by the Ceylon Government in 1910. Finally a site in Colombo was adopted as the best available from an "all-round" standpoint for a single station. The contract for the station was given to the Marconi Wireless Telegraph Co. in 1911 and the station was brought into use in 1912.

This Wireless Station is under the control of the Postmaster-General and Director of Telegraphs, and under the immediate direction of a European officer, Mr. J. R. Stapleton, who is subject to the supervision of the Chief Telegraph Engineer, Mr. A. E. McCloskey, on engineering matters and the Superintendent of Traffic, Mr. G. W. Praat, on traffic matters. The rest of the operating staff are Ceylonese members of the Postal Department.

The station belongs to the Government, and is worked as stated above. There are no *Experimental* or *Amateur* or *Ships' Stations* licensed in Ceylon, and no *Wireless Clubs* or Societies exist in the Island.

Wireless Telegraphy in Ceylon and its territorial waters was originally legislated for under an Ordinance of 1903. In 1908 an Ordinance (No. 35) regulating Telegraphy in general was passed, which was afterwards extended to affect Wireless Telegraphy by an Amending Ordinance (No. 15), passed in 1914. This later Ordinance, however, specifically cancelled a provision, contained in that of 1908, which provided for the continuance in force of the original 1903 enactment. The latter has, therefore, now been completely abrogated, and Wireless Telegraphy in Ceylon is regulated (a) by such clauses of the 1908 Ordinance as are applicable to Wireless Telegraphy; (b) by the Amending Ordinance (No. 15) of 1914; and (c) by the rules formulated under the provision of the latter Ordinance.

We print below the apposite sections of Ordinance 15 of 1914 and the rules based upon it.

A—Ordinance No. 15 of 1914 (August 18th).

B—Rules under this Ordinance.

ORDINANCE.

A Ordinance No. 15 of 1914 (modifying Ordinance No. 35 of 1908) and dated August 3rd, 1914, provides in its Clause 5 an amendment of Section 7 of the 1908 Ordinance. This prescribes the right of the Governor in Executive Council to "make rules, consistent with the Ordinance, for the conduct of all or any telegraphs established, maintained, or worked by the Government or by persons licensed under this Ordinance." Rules under this section may provide for all or any of the following, amongst other matters, that is to say:—

(a) The rates at which, and the other conditions and restrictions subject to which, messages shall be transmitted.

(b) The precautions to be taken for preventing the improper interception or disclosure of messages.

(c) The period for which, and the conditions subject to which, telegrams and other documents belonging to, or being in the custody of, telegraph officers shall be preserved ; and

(d) The fees to be charged for searching for telegrams and other documents in the custody of any telegraph officer.

(e) For prescribing the form and the manner in which applications for licences under this Ordinance are to be made.

(f) For prescribing fees payable on the grant of any licence.

(g) For regulating the manner in which an apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, in the waters of Ceylon, shall be worked so as to prevent interference with naval signalling, or the working of any wireless telegraph or telephone station lawfully established, installed, or worked in Ceylon or the waters thereof, and so as not to interrupt or interfere with the transmission of any messages between wireless telegraph or telephone stations established as aforesaid on land and wireless telegraph or telephone stations established on ships at sea.

(h) For prohibiting, except with the special or general permission of the Postmaster-General of Ceylon, the working or using of any apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, while such ship is in any of the harbours of Ceylon.

(i) For prohibiting or regulating, in case at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy on board merchant ships, whether British or foreign, in the waters of Ceylon, the use of wireless telegraphy on board such ships while in such waters by such further rules as the Governor may deem fit to make from time to time, either in all cases, or in such cases as may be deemed desirable.

Moreover, Clause 6 of Ordinance No. 15 of 1914 adds to Clause 7 of the 1908 Ordinance a new sub-section lettered (2) A, which runs as follows :—

Provided that no regulations made in respect of the matters described in paragraphs (g), (h), and (i) or sub-section (2) of this section shall apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

* * * * *

RULES.

B The current rules, under which the Wireless Telegraphy is at present administered, were issued on December 3rd, 1914. They were based on Ordinance 15 of 1914 (see above) and run as follows :—

DECEMBER 3, 1914.

1. Any person desirous of obtaining a licence for the establishment of a wireless telegraph station, or the installation or working of any apparatus for wireless telegraphy, in any place in the Colony, or on

board any British ship registered in the Colony, must apply in writing to the Colonial Secretary. Such application must contain full particulars—

- (a) Of the place or ship in respect of which a licence is sought ;
- (b) Of the nature of the apparatus which it is desired and proposed to instal and work ; and
- (c) Of the purposes for which the installation is intended to be utilised.

2. The following shall be the fees payable on the grant of licences :—

	Rs.
(a) For a licence for a land station	5
(b) For a licence for a ship station	5
(c) For an experimental licence	Free

3. All apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, in the waters of the Colony, shall be worked in such a way as not to interfere with—

(a) Naval signalling ; or

(b) The working of any wireless telegraph station lawfully established, installed, or worked in the Colony or in waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

4. In these regulations “ naval signalling ” means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty’s Navy, between ships of His Majesty’s Navy and Naval Stations, or between a ship of His Majesty’s Navy or a Naval Station and any other wireless telegraph station, whether on shore or on any ship.

(5) No apparatus for wireless telegraphy on board a merchant ship shall be worked or used while such ship is in any harbour, port, or bay of the Colony, except with the special or general permission of the Postmaster-General.

6. (i.) If at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that His Majesty’s Government should have control over the transmission of messages by wireless telegraphy on board merchant ships, and notice to that effect is published by the Postmaster-General, after the publication of such notice and until further notice the use of wireless telegraphy on board merchant ships, whether British or foreign, whilst in the waters of the Colony, shall be subject to such rules as may be made by the Governor, and such rules may prohibit or regulate such use in all cases, or in such cases as may be deemed desirable.

(ii.) Such notice as aforesaid shall be published in the *Ceylon Government Gazette*, and in such other manner, if any, as to the Postmaster-General may seem fit.

7. For the purpose of any proceedings under these regulations the master or person being or appearing to be in command or charge of any ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.

8. Any summons or other document in any proceedings under these regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in command or charge of the ship.

9. These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

CHINA

FOREIGN SETTLEMENTS.

(For Laws of the Republic see under "Chinese Republic," page 250.)

(1) Hongkong

THE Crown Colony of Hong Kong consists of a number of islands situated off the south-eastern coast of China, at the mouth of the Canton River, and of a portion of the adjacent mainland. They lie between latitude $22^{\circ} 10'$ and $22^{\circ} 34'$ North; whilst the longitude extends between $113^{\circ} 52'$ and $114^{\circ} 30'$ East. The capital of the Colony is Victoria, built on the northern shore of Hong Kong Island, facing the mainland. The magnificent harbour consists of the arm of the sea which lies between the mainland and the city. It was first occupied by Great Britain in January, 1841, and is now administered as a Crown Colony, under a Governor aided by an Executive Council of eight members and a legislative council of fourteen.

Reference to the "Wireless Map of the World" will show that Hong Kong possesses a wireless station, known as Cape d'Agular, and recent advices state that an additional installation is under construction for the Royal Observatory, destined for the reception of time signals from the Far Eastern stations. After the war it is proposed to instal apparatus for distributing time signals by relay via the Cape d'Agular radio station. The Government hopes that arrangements may then be made for receiving meteorological observations from ships at stated times.

Subject, doubtless, to some special reservations introduced to cover war conditions (which had not come to hand at the time of our going to press), the regulation of wireless telegraphy is carried on under the provisions of the Wireless Telegraph Ordinance, 1913, passed on July 24th of that year, which repealed all previous Ordinances; and by regulations issued under that Ordinance.

A—The Wireless Telegraphy Ordinance, 1913.

B—Regulations.

ORDINANCE No. 20 OF 1913

A 1. This Ordinance may be cited as "The Wireless Telegraphy Ordinance, 1913."

2. "Telegraph" means an electric, galvanic or magnetic telegraph and includes appliances and apparatus for transmitting or making telegraphic, telephonic or other communications by means of electricity, galvanism or magnetism.

The expression "Wireless Telegraphy" means any system of communication by "telegraph" (as defined in this Ordinance) without the aid of any wire connecting the points from and at which the messages or other communications are sent and received : provided that nothing in this Ordinance shall prevent any person from making or using an electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. The Governor may whenever he shall deem it expedient to do so license the establishment of any wireless telegraph station or the installation or working of any apparatus for wireless telegraphy in any place in the Colony or on board any British ship registered in the Colony.

4.—(1) No person shall establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place in the Colony or on board any British ship registered in the Colony except under and in accordance with a licence granted in that behalf by the Governor.

(2) Every such licence shall be in such form and for such period as the Governor-in-Council may determine and shall contain such terms, conditions and restrictions on and subject to which the licence is granted as the Governor shall consider desirable in the public interest.

5.—(1) If any person establishes a wireless telegraph station without a licence in that behalf or installs or works any apparatus for wireless telegraphy without a licence in that behalf he shall be liable to a fine not exceeding one thousand dollars or to imprisonment for a term not exceeding twelve months, and in either case be liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence, but no proceedings shall be taken against any person under this Ordinance except with the previous sanction of the Attorney-General.

(2) If a Magistrate is satisfied by information on oath that there is reasonable ground for believing that a wireless telegraph station has been established without a licence in that behalf or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any ship within the jurisdiction without a licence in that behalf he may grant a search warrant to any police officer to enter and inspect the station, place, or ship, and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

6.—(1) The Governor-in-Council may make regulations for all or any of the following matters :—

- (a) For prescribing the form and manner in which applications for licences under this Ordinance are to be made ;
- (b) For prescribing the fees payable on the grant of any licence ;
- (c) For regulating the manner in which apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, in the waters of the Colony shall be worked so as to prevent interference with naval signalling or the working of any wireless telegraph station lawfully established, installed, or worked in the Colony or the waters thereof, and so as not to interrupt or interfere with the transmission of any wireless messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea ;

- (d) For prohibiting, except with the special or general permission of the Colonial Secretary, the working or using of any apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, whilst such ship is in any of the harbours of the Colony;
- (e) For prohibiting or regulating, in case at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that his Majesty's Government should have control over the transmission of messages by wireless telegraphy on board merchant ships, whether British or foreign, in the waters of the Colony, the use of wireless telegraphy on board such ships while in such waters by such further rules as the Governor may see fit to make from time to time and either in all cases or in such cases as may be deemed desirable.

(2) Provided that no regulations made in respect of the matters described in paragraphs (c), (d) and (e) of this section shall apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

7. When an applicant for a licence proves to the satisfaction of the Governor that the sole object of obtaining the licence is to enable him to conduct experiments in wireless telegraphy a licence for that purpose shall be granted subject to such special terms, conditions, and restrictions as the Governor may think proper, but shall not be subject to any rent or royalty.

8.—(1) Every omission or neglect to comply with and every act done or attempted to be done contrary to the provisions of this Ordinance or of any regulation made thereunder or in breach of the conditions and restrictions subject to or upon which any licence has been issued shall be deemed to be an offence against this Ordinance, and for every such offence not otherwise specially provided for the offender shall, in addition to the forfeiture of any articles seized, be liable to a fine of five hundred dollars.

(2) All convictions, forfeitures, and fines under this Ordinance or any regulations made thereunder may be had and recovered before a Magistrate.

9. The Wireless Telegraphy Ordinance, 1903, the Wireless Telegraphy Ordinance, 1909, and the Wireless Telegraphy Amendment Ordinance, 1909, are hereby repealed.

B THE following Regulations were made by the Officer Administering the Government in Council under the provisions of Section 6 of the Wireless Telegraphy Ordinance No. 20 of 1913), on November 20th, 1913 :—

1. Any person desirous of obtaining a licence for the establishment of a wireless telegraph station or the installation or working of any apparatus for wireless telegraphy in any place in the Colony, or on board any British ship registered in the Colony, must apply in writing to the Colonial Secretary. Such application must contain full particulars—

- (a) of the place or ship in respect of which a licence is sought,
- (b) of the nature of the apparatus which it is desired and proposed to instal and work, and

(c) of the purposes for which the installation is intended to be utilised.

2. The following shall be the fees payable on the grant of licences :

(a) for a licence under Section 3 for a land station \$2.50

(b) for a licence under Section 3 for a ship station.... \$2.50

(c) for an experimental licence under Section 7 Nil.

3. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the Colony shall be worked in such a way as not to interfere with—

(a) Naval signalling, or

(b) the working of any wireless telegraph station lawfully established, installed, or worked in the Colony or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

4. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used whilst such ship is in any of the harbours of the Colony except with the special or general permission in writing of the Colonial Secretary of the Colony.

5. If at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that his Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships whilst in the territorial waters shall be subject to such further rules as may be made by the Governor from time to time, and such rules may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

6. These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

7. No proceedings shall be taken against any person under this Regulations except with the previous sanction of the Attorney-General.

(2) Weihaiwei

WEIHAIWEI, a territory in the Shantung district of China, leased by that Republic to Great Britain in 1898, lies between latitude 37° 30' N. and longitude 120° 10' E. The total area comprises 285 square miles and the administration is in the hands of a Commissioner.

Wireless Telegraphy in the territory was originally regulated under Ordinance No. 1 of 1904 (see *YEAR-BOOK*, 1904) ; but this has since been repealed and the Ruling Ordinance is now No. 5 of 1913, which will be found below.

ORDINANCE NO. 5 OF 1913.

An Ordinance to provide for the regulation of Wireless Telegraphy.
L.S.

August 11th, 1913.

BE IT ENACTED by the Commissioner of Weihaiwei as follows :—

1. This Ordinance may be cited as “ The Wireless Telegraphy Ordinance 1913.”

2. "Telegraph" means an electric, galvanic or magnetic telegraph and includes appliances and apparatus for transmitting or making telegraphic, telephonic or other communications by means of electricity, galvanism or magnetism.

The expression "Wireless Telegraphy" means any system of communication by "telegraph" (as defined in this Ordinance) without the aid of any wire connecting the points from and at which the messages or other communications are sent and received : provided that nothing in this Ordinance shall prevent any person from making or using an electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. The Commissioner may whenever he shall deem it expedient to do so license the establishment of any wireless telegraph station or the installation or working of any apparatus for wireless telegraphy in any place in the Territory or on board any British ship registered in the Territory.

4.—(1) No person shall establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place in the Territory or on board any British ship registered in the Territory except under and in accordance with a licence granted in that behalf by the Commissioner.

(2) Every such licence shall be in such form and for such period as the Commissioner may determine and shall contain such terms, conditions and restrictions on and subject to which the licence is granted as the Commissioner shall consider desirable in the public interest.

5.—(1) If any person establishes a wireless telegraph station without a licence in that behalf or installs or works any apparatus for wireless telegraphy without a licence in that behalf he shall be liable to a fine not exceeding one thousand dollars or to imprisonment of either description for a term not exceeding twelve months and in either case be liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence, but no proceedings shall be taken against any person under this Ordinance except with the previous sanction of the Commissioner.

(2) If a Magistrate is satisfied by information on oath that there is reasonable ground for believing that a wireless telegraph station has been established without a licence in that behalf or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any ship within the jurisdiction without a licence in that behalf he may grant a search warrant to any police officer to enter and inspect the station, place or ship and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

6.—(1) The Commissioner may make regulations for all or any of the following matters :—

(i.) For prescribing the form and manner in which applications for licences under this Ordinance are to be made ;

(ii.) For prescribing the fees payable on the grant of any licence ;

(iii.) For regulating the manner in which apparatus for wireless telegraphy on board a merchant ship whether British or foreign in the waters of the Territory shall be worked so as to prevent interference with naval signalling or the working of any wireless telegraph station lawfully established, installed or worked in the Territory or the waters thereof and so as not to interrupt or interfere with the transmission of any wireless messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea ;

(iv.) For prohibiting except with the special or general permission of the Commissioner the working or using of any apparatus for wireless telegraphy on board a merchant ship whether British or foreign whilst such ship is in any of the harbours of the Territory ;

(v.) For prohibiting or regulating in case at any time in the opinion of the Commissioner an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy on board merchant ships whether British or foreign in the waters of the Territory the use of wireless telegraphy on board such ships while in such waters by such further rules as the Commissioner may see fit to make from time to time and either in all cases or in such cases as may be deemed desirable.

(2) Provided that no regulations made in respect of the matters described in paragraphs (iii.) (iv.) and (v.) of this section shall apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

7. When an applicant for a licence proves to the satisfaction of the Commissioner that the sole object of obtaining the licence is to enable him to conduct experiments in wireless telegraphy a licence for that purpose shall be granted subject to such special terms, conditions and restrictions as the Commissioner may think proper, but shall not be subject to any rent or royalty.

8.—(1) Every omission or neglect to comply with and every act done or attempted to be done contrary to the provisions of this Ordinance or of any Regulation made thereunder or in breach of the conditions and restrictions subject to or upon which any licence has been issued shall be deemed to be an offence against this Ordinance, and for every such offence not otherwise specially provided for the offender shall in addition to the forfeiture of any articles seized be liable to a fine of five hundred dollars.

(2) All convictions, forfeitures and fines under this Ordinance or any Regulations made thereunder may be had and recovered before a Magistrate.

9. Ordinance No. 1 of 1904 to regulate the establishment of wireless electric telegraphs is hereby repealed.

CHINESE REPUBLIC

THE area covered by the eighteen provinces which comprise this vast republic is estimated at over 1,500,000 square miles. During the whole of its long and interesting history it remained under monarchical rule until the present form of government was established in October, 1911.

The Central Government, located at the Capital City of Peking, is developing the resources of the country and extending communications. Wireless telegraphy is bound to play an important part in this development and a reference to our Land Stations Section will show that ten stations have already been notified.

The regulation of radiotelegraphy is carried out under the "Telegraph Act" which was promulgated on the 16th April, 1915. As far as the handling of radiotelegrams is concerned, the Wireless Stations on the Chinese Coast are governed by the Regulations of the International Radiotelegraph Convention, 1912 (see pages 35-75) and the Service Regulations appertaining thereto. The entire charge for radiotelegrams is collected from the senders, and the accounts of the Chinese Coast Stations are settled with the Governments to which the ship stations are subject, or with the companies managing and controlling the Wireless Ship Stations (see "Ships Station" Section of this volume).

At present radiotelegraphy in China awaits development, and the laws and regulations affecting the subject consist, therefore, of those formulated to govern the working of the ordinary wired telegraph, and telephone, applied, as far as they are applicable, to radiotelegraphy. For this reason we present here a translation of the Chinese general regulations affecting all electrical means of communication, with a few comments emphasising the points which appear to affect wireless telegraphy.

INSTRUCTIONAL ORDER NO. 20.

Dated April 18th, in the fourth year of the Republic of China (*i.e.*, 1915).

REGULATIONS AFFECTING ELECTRICAL MEANS OF COMMUNICATION.

ART. 1.—All telegraphs and telephones, whether wired or wireless, shall be included in the term "Electrical means of Communication."

ART. 2.—All electrical means of communication shall be owned and controlled by the State.

ART. 3.—The following electrical means of communication may be set up by private individuals or corporations after the sanction of the Government has been obtained:—

(a) Those established for the exclusive use of railways, mines or other specific and commercial enterprises.

(b) Those which are set up by individuals or corporations or Official Departments on their premises for the purpose of establishing connection with a public telegraph office for the convenience of the transaction of the business carried on by the said individuals or corporations.

(c) Those which are used by individuals, corporations, or official departments for intercommunication between various parts of the building in which they are located.

(d) Those which are used by ships *in transitu*.

(e) Those which are set up for the purpose of experiment or research.

(f) Telephones whose calling powers are to be confined within a certain definite area. These must not, however, be erected in any area which is at present furnished with telephonic communication.

[*This clause appears to be one intended to apply to future telephone installations and not to any which may be at present erected. Of the above items it will be noted only (d) and (e) can apply to wireless telegraphy.*]

ART. 4.—The Government, in case of necessity, may in accordance with the provision of Laws and Edicts, seize all private electrical means of communication and convert them to public or military use. When, under the provision of this regulation, the Government so seize and make use of private owned electrical means of communication, it may appoint officials to take charge of and work them.

ART. 5.—When the Government consider it necessary in the interests and for the maintenance of public safety, they can restrict, suspend or cancel any use of electrical means of communication within certain prescribed areas.

ART. 6.—The Superintendent officials at telegraph offices controlled by the Government may suspend the transmission of any message or refuse altogether to accept it, when they consider its contents to be opposed to public safety.

ART. 7.—When special circumstances or *force majeure* cause telegrams to be delayed in transmission or prevent their transmission, the senders cannot claim compensation for damage arising from such delay or hindrance.

ART. 8.—Correspondents are themselves responsible for the contents of their messages.

ART. 9.—With regard to the transmission of telegrams or telephone messages no exemption with regard to liability or responsibility can be entertained on the ground of mental deficiency on the part of the sender.

ART. 10.—Telegrams received at public telegraph offices—other than those specified by Government orders—will be delivered in accordance with the addresses given by the sender. If, owing to the fact that the address given is incorrect or insufficient, the telegram cannot be delivered, this fact will be publicly announced, and if no application for the message is received within 42 days from the date of the public announcement, the said message will be destroyed.

ART. 11.—When messages are received in secret code, or in obscure or metaphorical language, the telegraph officials may, if they think fit, call upon the sender to translate the code or elucidate the meaning of the message. If the sender refuses to de-code or explain, or, in complying with this request, fail to put the telegraph official truthfully in possession of the real meaning of the message the official may stop the transmission of the said message.

ART. 12.—Officials, workmen, or messengers engaged in the performance of their duty in connection with telegraphs or telephones are

not to be interfered with or stopped by the authorities of the customs or by those operating the canal locks.

ART. 13.—Officials, workmen, or messengers when proceeding in discharge of their official functions are to be allowed unhindered transit over building-land and fields (with the exception of those enclosed by walls and gateways) whenever there may be any hindrance to their transit through the regular streets or paths. But if the passage of such Officials, workmen, or messengers causes damage to be done to buildings, or to crops in cultivated property, the Government will pay adequate compensation on the application of the owner and on his proof of such damage.

ART. 14.—When officials, workmen, or messengers engaged in performing their official functions ask for help or assistance in order to overcome any special hindrance in transit, or when they ask for assistance in climbing mountains or crossing rivers, the persons to whom such request is made may not refuse such help or assistance without assigning adequate reason for so doing. But in the event of such assistance being rendered, the Government will give the person rendering it fit and proper remuneration for such aid and assistance, on his application for such remuneration.

ART. 15.—Telegraph or Telephone wires may be set up at convenient places, no matter through what property it is necessary for them to pass; but if their erection involves an encroachment on the rights of others, whether private individuals or corporations, the Government will on application, allot adequate compensation for such encroachment.

ART. 16.—Charges for telegrams and telephone messages shall be collected in cash according to fixed rates.

ART. 17.—Materials used for the purposes of Telegraph and Telephone Services shall be exempted from tax, but not from Customs Duties.

ART. 18.—With reference to the compensation for damage caused, and the right of application for remuneration referred to in the above clauses in connection with the carrying out of Electrical Means of Communication, the period within which such right to compensation or remuneration may be dealt with, and the manner in which it may be so dealt with and adjudicated, shall be regulated by separate "Instructional Orders."

ART. 19.—Any who may offend against Articles 2, 3, 4, 12, 13, and 14 shall be liable to a fine of from 5 to 200 dollars. Those who offend against Articles 2 and 3 shall, in addition to fines, be liable to confiscation of poles, wires, machines or other apparatus.

ART. 20.—The conditions laid down in Articles 12–19 shall not be applicable to private electrical means of communication, but the specially authorised telephones erected under section (f) or Article 3 may adopt the regulation comprised in Article 16.

ART. 21.—All Laws, Orders or Treaties affecting telegrams between China and Foreign Countries shall have their respective provisions observed and the provisions of this Instructional Order shall not be held to modify or abrogate them.

ART. 22.—These regulations shall come into force immediately on the date of their promulgation.

COLOMBIA (REPUBLIC OF)

THE Republic of Colombia lies between latitude $2^{\circ} 40'$ S. and $12^{\circ} 25'$ N., its longitude extending from $68^{\circ} 0'$ to $79^{\circ} 0'$ W. Its superficial area is estimated at 461,606 square miles, its population at $5\frac{1}{2}$ millions. The country is intersected by three great ranges of the Andes Mountains known as the Western, Central and Eastern Cordilleras, the latter of which is the more important as it affords a series of vast table-lands, cool and healthy. Railroads are in their infancy and the telegraphic wiring is estimated at a little under 9,000 miles.

No special regulations have been issued through the medium of wireless legislation, but in accordance with the current Colombian laws wireless as well as wired telegraphy constitutes a Public Service under State control in every way. The Government does, however, in certain special cases grant permission for contracts, under which radiotelegraphic service may be instituted by private companies. As instances of such concessions we may cite the stations of Santa Marta and Cartagena, installed by the "United Fruit Company" and the "Gesellschaft Für Drahtlose Telegraphie M.B.H." respectively. The Government only owns and works in the territory of the Republic a single station, located in the Archipelago of San Andres y Providencia, erected by the last-named company.

The station of Santa Marta was the first wireless installation in the Republic, that of Cartagena being next in order, the most recent being the Government station of San Andres y Providencia.

Control of radiotelegraphy in Colombia is vested in the Minister of the Interior, who is ultimately responsible, whilst the executive authority is wielded by the Minister of Posts and Telegraphs.

COMMONWEALTH OF AUSTRALIA

(See AUSTRALIA (COMMONWEALTH OF), page 162.)

CURAÇAO

(See under NETHERLANDS, page 384.)

DEMERARA

(See article "British Guiana," under WEST INDIES (BRITISH), page 556.)

DENMARK

THE area of the Kingdom of Denmark, according to the survey of 1911, totals 15,582 square miles. The country is ruled under a Constitutional Monarchy, the Crown of Denmark having been elective from the earliest times.

The territory ruled by King Christian X. includes the peninsula of Jutland and several islands in the Baltic Sea, the most important of which are Zealand and Funen; besides the dependencies of Iceland (in the North Atlantic Ocean) and the Farøe Islands (north of the Shetlands).

The Government is what is called Parliamentary Government, the executive power being vested in the Sovereign (acting through

his Ministers) assisted by the Cabinet consisting of ten Secretaries of State and one Minister without portfolio, whose power rests upon the possession of a majority in the Lower House (Folketinget). The Constitution rests on the fundamental law of June 5th, 1849. This fundamental law has, however, been revised by Parliament, was ratified by the King on June 5th, 1915, and will become effective in May 1918.

Wireless Telegraphy is naturally of considerable importance to a maritime nation like that of the Danes, whose fatherland is at no point any great distance from the sea. It is a Government monopoly, and the administration is supervised by the Minister of Public Works.

Originally radiotelegraphy was adopted in Denmark by the Lighting Department (1901) and by the Royal Navy (1902) but later on the commercial use of radiotelegraphy was organised under the supervision of the Telegraph Department (acting under the jurisdiction of the Department of Public Works), the Naval Department, and Lighting Department (both under the Admiralty) as well as the State Railway Department. These various departments exercise jurisdiction independently over their own radiotelegraphic section.

PUBLIC DEPARTMENTS CONTROLLING WIRELESS TELEGRAPH OPERATIONS.

Official.	Title.	Address.
J. Hassing Jorgensen	Secretary of State for Public Works	Copenhagen K. Slotsholmsgade 6.
N. Meyer... ..	Director of the Telegraph Department	Copenhagen B. Vesterbrogade 40-42.
W. Thomsen	Chief Engineer of the Technical Department	Copenhagen B. Vesterbrogade 40.
W. Bjarnov	Chief Engineer, Wireless Section	Copenhagen B. Vesterbrogade 42.
H. Schledermann ...	Electrical Engineer in Chief R.D.N.	Copenhagen B. Vesterbrogade 42.
W. Bjarnov	Chief Engineer, Wireless Section	
	Inspec- tors of Ship Stations	

The first stations erected were those at Blaavandshuk (lighthouse) and on board the *Horns Rev* (lightship), both of them dating from 1901. The latest available statistics enumerate :

LAND STATIONS.

- (a) Five directly controlled by Government (Two of them situated on the Farøe Islands).
- (b) No privately owned stations.
- (c) One experimental station (Lyngby Radio).
- (d) One instructional station (Svendborg Radio, with corresponding station *Jylland* frigate).

SHIP STATIONS.

- (a) None with comparatively high power.
- (b) Seventy with lower power.
- (c) Forty-five Government vessels.
- (d) Twenty-five private vessels.

There is one wireless club, "Skandinavisk Radiotelegrafist Forening," which figures in the section of the YEAR BOOK devoted to Wireless Clubs and Societies (see p. 1134).

The first Act to regulate radiotelegraphy in Denmark was passed in 1907 (Act No. 99 of April 19th) and appears *in extenso* in the YEAR BOOK for 1917, p. 194. New regulations became effective on July 1st, 1913, and these also appear in the YEAR BOOK for 1917, p. 195. Both are reprinted below.

Special regulations for experimental stations, instructional stations, etc., became effective in August, 1914, and are given *in extenso* on pages 262-265.

The following Acts are those under which the regulation is at present conducted, although we understand that preparations are being made for considerable radiotelegraphic activity after the close of the present conflict.

A—Act 99 of 1907.

B—Rules dated July, 1913.

C—Regulations for Special Stations.

A The regulations affecting Wireless Telegraphy in Denmark are based upon :—

ACT No. 99 OF APRIL 19TH, 1907.

1. The Government shall have the sole right to erect and operate wireless telegraphs (radiotelegraphs) within the Danish boundaries and maritime territory.

2. Telegraph stations on board ships under foreign flag must only be utilised on Danish maritime territory when following the regulations to be drawn up in this respect by the Minister for Public Works. The Minister may prohibit every kind of telegraphic communication from such stations and take the necessary measures to carry through such prohibition, when in his opinion circumstances require it.

3. On board ships under Danish flag, not owned by the Government, telegraph stations must only be fitted and operated both on and outside Danish maritime territory according to licence previously obtained from the Minister of Public Works. In case the conditions concerning the fitting and working of the station stipulated in the licence are not maintained, the Minister may cancel the licence.

In case it is desired that the working of stations being in operation at the time when the Act comes into force, should be continued, an application to that effect must be filed with the Minister for Public Works not later than four weeks after the Act has come into force, the Minister having then to decide whether and on what conditions the operation of the station may be continued.

4. Scientific and technical trials with wireless telegraphy must be made by no others than the State Authorities unless permission to that effect has been previously obtained from the Minister for Public Works.

5. The regulations stipulated in Act No. 84 of May 11th, 1897, Art. 17, concerning the duty as to secrecy incumbent on the officers and functionaries of the Telegraph Department and concerning the punishment they may be subjected to in the case of a breach of the aforesaid duty, should also be applicable to wireless operators. The regulations stipulate in Art. 18 of the same Act concerning corresponding regula-

tions for employers of private companies may also be made applicable towards operators on board ships.

6. Any contravention of the regulations given in Articles 1-4 shall be punished, provided that the circumstances concerned according to their nature do not inflict a more serious punishment, with forfeiture of the apparatus unlawfully placed and utilised. Furthermore, the contravening person may be liable to a fine of up to 400 kroner, which fine shall devolve to the Treasury. Such contraventions shall be dealt with in the same way as public police cases. The Minister for Public Works shall be the only person entitled to institute proceedings against contraveners of this Act.

REGULATIONS.

MADE EFFECTIVE ON JULY 1ST, 1913.

B In accordance with Act No. 99 of April 19th, 1907, concerning wireless telegraphs (radiotelegraphs) and the International Convention concerning radiotelegraphs drawn up in London, on July 5th, 1912, supplemented by appendix decisions, finishing protocol and service regulations, the following decisions shall be observed in founding and working of radiotelegraph stations and in the handling of radiotelegrams:—

I.—ESTABLISHING OF RADIOTELEGRAPH STATIONS.

1. On Danish soil and on board ships permanently anchored, such as lightships, etc., radiotelegraph stations (coast stations) can only be established by the Government.

2. On board ships under Danish flag, not owned by the Government, radiotelegraph stations (ship stations) may only be established and operated after permission has been previously obtained from the Department of Public Works.

The licence or a certified duplicate of it must always be kept on board the ship.

The licence may be withdrawn if the conditions for the fitting and operation of the station, set out therein, are not complied with; in such cases the entire apparatus belonging to the station must be removed.

3. Applications for licences to establish and operate radiotelegraph stations on board ships sailing under the Danish flag must be drawn up on forms approved of by the Department of Public Works, delivered and sent in duplicate to the Telegraph Department, and must be supplied with an endorsement to the effect that the station will fulfil the following conditions:—

(a) The waves transmitted must be as pure and as little damped as possible; the utilisation of transmitting apparatus, by which the transmitted waves are generated by a direct sparking discharge in the antenna, especially, is only permissible in case of need. This latter arrangement of the transmitter may, however, be permitted in the case of certain special stations (as, for instance, on board small vessels), the primary energy of which does not exceed 50 watt.

(b) The speed of transmission and reception must be no less than twenty words a minute, the word to consist of five letters.

New installations utilising an energy of more than 50 watt must be fitted in such a way as to make it easy to obtain more telegraph distances, smaller than the normal ones, the smallest of which should be about 15 nautical miles (equal about 28 km.). Old installations utilising an energy of more than 50 watt must be altered, if possible, so as to comply with the regulations mentioned above.

(c) The receiving apparatus, protected in the best possible way against disturbances, must be able to receive signals with the wave lengths of up to 600 m., which are stipulated for the ship station.

(d) The primary energy of the station measured across the generator must under no circumstances exceed 1 k.w.

(e) Larger energy than 1 k.w. may, however, be utilised, if the ship is to interchange telegrams over a distance of more than 200 nautical miles (equal 370 km.) with the nearest station, or if communication, due to interference is not obtained unless by an increase of the transmitting energy.

(f) The station must be operated by one or more operators who have obtained certificates as specified below in Section 7.

The station must not be opened for communication until the telegraph department has issued a certificate, which will not be granted until the department, by inspection, is satisfied that the conditions set out in the licence granted by the Department of Public Works have been fulfilled.

II.—INSTALLATION, SERVICE AND OPERATION OF PRIVATE SHIPS' STATIONS.

4. The apparatus of ship stations must at any time be in strict accordance with the conditions set out in the licence for their establishment.

5. The hours of service of each coast station are decided by the Government Department.

As far as the hours of service of ship stations are concerned, these stations are divided into the following three classes:—

- (1) Stations with continuous hours of service.
- (2) Stations with limited hours of service; and
- (3) Stations with no fixed hours of service.

During navigation stations with continuous hours of service must be attended to constantly at the aural apparatus. In the case of stations with limited hours of service the aural apparatus must be attended to during all of the hours of service as well as during the first ten minutes of each hour not comprised in the normal hours of service. Stations with no fixed hours of service are not obliged to keep any regular watch over the aural apparatus.

The classification of a ship as regards the hours of service of same shall be stated in the licence.

6. Any ship station must be fitted to utilise wave lengths of 600 m. and 300 m. respectively. The normal wave length is 600 m. Small ships may, however, be allowed to utilise wave lengths of 300 m.; but they must always be able to receive telegrams with a wave length of 600 m. During the hours of service each ship station must be capable of being called with its normal wave length.

Ship stations maintaining continuous watch and ship stations with limited hours of service shall be bound to have a radiotelegraphic spare installation, the single parts of which must be placed as safely as possible. This installation must have a source of energy of its own and must be capable of being put into use quickly, must be able to work satisfactorily for at least six hours and must have a minimal range of :—

80 nautical miles (equal about 150 km.) for ship stations belonging to the first class (maintaining continuous watch).

50 nautical miles (equal about 100 km.) for ship stations belonging to the second class (with limited hours of service).

This special installation is not required in the case of ships, the normal installations of which comply with the requirements of spare installations mentioned above.

7. The service of the ship station must be maintained by operators who are in possession of certificates granted by the Department of Public Works.

In cases of urgent necessity and during one voyage only the service of a ship station may be undertaken by one or more operators holding a certificate from a foreign Government, which Government has joined the International Convention concerning radiotelegraphs.

The certificate shall certify :—

Partly the ability of the operator :

(a) In the maintenance of the apparatus and knowledge of their working.

(b) In the sending and receiving (by sounding) of telegrams with a speed :

(1) No less than twenty words a minute for obtaining a certificate of first class, and

(2) No less than twelve words a minute for obtaining a certificate of second class.

(c) In the knowledge of the regulations utilised, governing radiotelegraph service.

Partly that the operator shall be bound to secrecy and subject to penalty, etc., for a breach of this condition as in the case of State telegraph operators.

Operators holding a certificate of second class may do service :—

(a) On board ships utilising radiotelegraph in their own service or for the correspondence of the crew only.

(b) As assistant operators on board all ships having at least one operator holding a certificate of first class.

Ship stations with continuous service must be operated by at least two operators holding a certificate of first class.

The radiotelegraph service of the ship stations is placed direct under the master of the ship concerned.

In the event of a contravention of the regulations governing the operation of the radiotelegraph service, the certificate may be cancelled by the Department of Public Works.

No unauthorised person must be allowed to enter the wireless cabin.

8. If technically possible, ship stations must interchange telegrams with other stations (coast or ship stations), without regard to the system of radiotelegraphy employed at the station concerned. The interchange of telegrams with other ship stations must, however, be so arranged that the working of coast stations is not interfered with, these as a rule having the priority in public telegraph service.

The operation of a station must as far as possible be arranged so that it does not interfere with other stations.

Exchange of superfluous signals and words is prohibited. Experiments and practice shall only be permitted in so far as the service of other stations is not interfered with; therefore, they must be executed with no other wave lengths than those utilised in the case of public telegram exchange, and utilising as little energy as possible.

When a ship is in a Danish harbour her station must only be utilised for communication with ships in distress.

9. According to the London Convention, the Telegraph Department must notify the Berne Bureau of the ship installation, and the Telegraph Department can demand to be furnished with any information regarding the installation, service, and working of a ship station, both for this and for other purposes.

10. The Telegraph Department will see that all conditions for the fitting and operation of ship stations are complied with. The inspectors for this purpose, **who are** selected by the Director of Telegraphs, must at any time on showing their authority be admitted to inspect and test the station, provided that the ship is within Danish waters. All information required by the said inspectors must be immediately given, and their directions must be complied with, pending the decision of the Director of Telegraphs, or, that of the Department of Public Works.

For the proper carrying out of the inspection the inspectors shall be paid a daily remuneration in addition to travelling expenses; such amount shall be paid by the Telegraph Department, but will have to be refunded (on demand) by the owners of the ship in question.

III.—HANDLING OF RADIOTELEGRAMS.

11. Radiotelegraph stations open for public service for the transmission and reception of telegrams may be used by any person, unless the public telegram exchange at the station in question is limited to a certain special kind of telegrams (see section 14).

The telegrams are divided into three classes:—

- (1) State telegrams.
- (2) Service telegrams.
- (3) Private telegrams.

The right to transmit State telegrams and service telegrams, and the right to priority for such messages, is at any time governed by the provisions embodied in the International Telegraph Regulation and the Inland Telegraph Regulation governing the transmission of such telegrams over ordinary telegraph systems.

12. Regarding the radiotelegraph traffic, the handling of telegrams is governed by the International Radiotelegraph Service Regulation, Articles XIV-XV, XIX-XL, XLV-XLIX. The handling of telegrams to and from coast stations and over the ordinary telegraph and telephone system is at any time governed by the Inland and International regulations for such traffic.

13. State and service telegrams may under all conditions be written in code or cypher. Private telegrams in code or cypher may be interchanged only with coast stations of such countries where this method of communication is allowed.

14. The ship stations may be licensed for :—

Ordinary public telegraph communication.

Limited public telegraph communication (with specified ships, with specified shipping lines, etc.)

Private telegraph communication.

Special telegraph communication (exclusively for State use, etc.)

In the public telegraph communication the following special radiotelegrams are to be received and handled :—

(1) Radiotelegrams with prepaid reply.

(2) „ (collated telegrams)

(3) „ to be delivered by express messenger.

(4) „ to be delivered by post.

(5) „ with more addresses than one

(6) „ with certificate of arrival. Certificates of arrival are handled on lines of telegraphs only.

(7) Paid service messages, except such as require a repetition or an information.

(8) Express telegrams, which are, however, only transmitted as such on the ordinary lines of telegraphs and under the proviso that the prescriptions of the International Telegraph Regulations are followed.

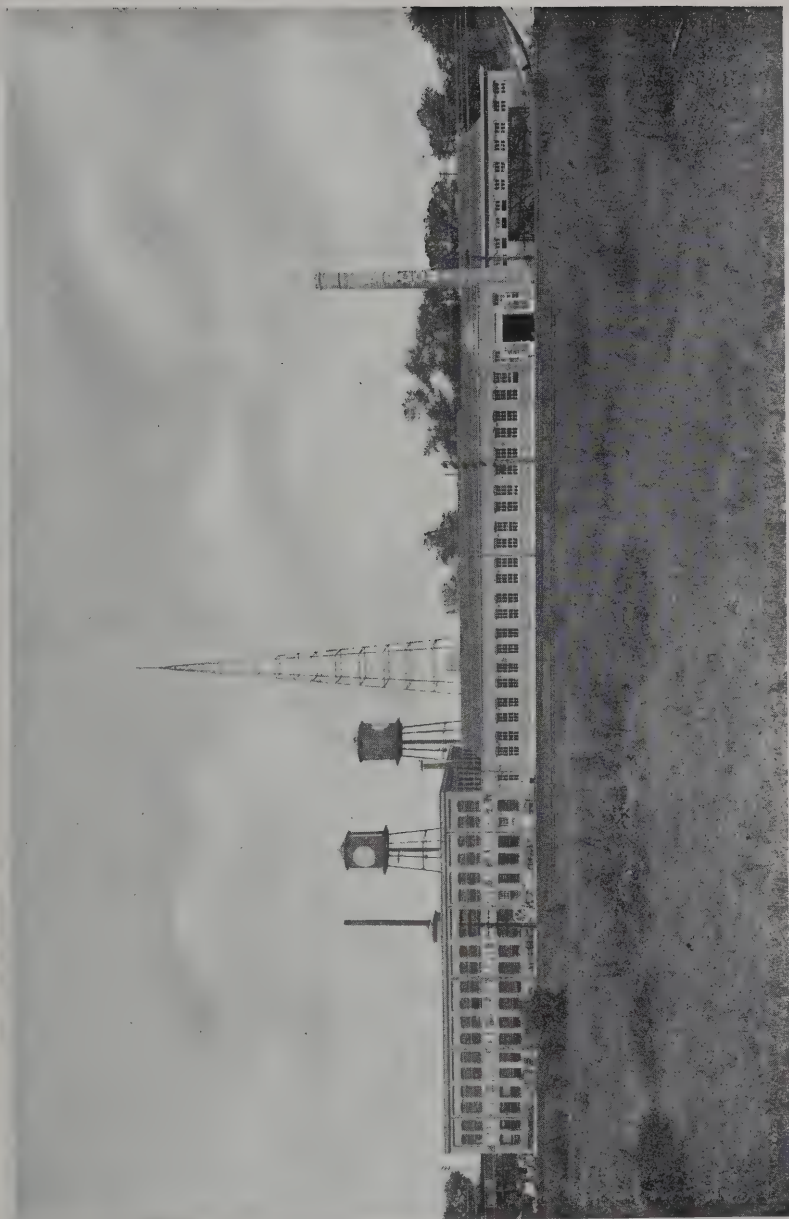
All stations are bound to receive, answer, and, if possible, further to communicate messages from ships in distress and give these absolute priority.

Ship stations, however, have no responsibility whatever regarding the radiotelegraph communication.

Ship stations intended for public telegraph service shall get such printed forms, service journals, tariff lists, etc., as are necessary for this service, from the Telegraph Department against payment of fixed amounts. It is the duty of the station to take care that a sufficient supply of these things is always available. Such stations must furthermore be governed by all the instructions regarding the installation and operation of the station and the handling of the traffic issued by the Telegraph Department.

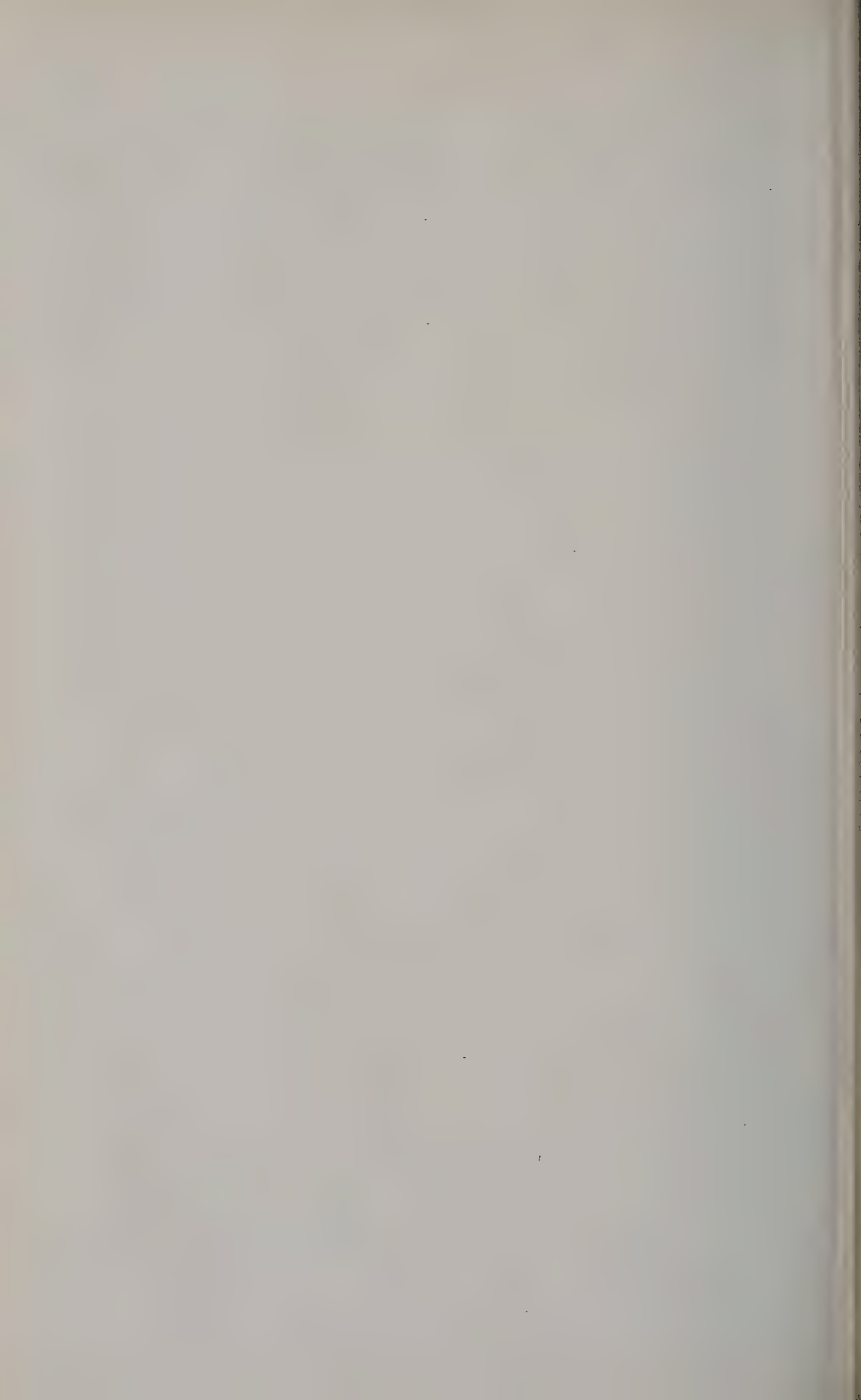
15. The abbreviations mentioned below covering the terms also mentioned below may be utilised; they are written between two double hyphens before the address, and are charged as one word :—

To be delivered to addressee only	...	..	MP
Delivered open	...	...	Ouvert
Private express telegram	...	...	Urgent or D
x Addresses	...	...	TMx
Reply paid x	...	...	RPx
Urgent reply paid x	...	...	RPDx



NEW WORKS OF THE MARCONI WIRELESS TELEGRAPH COMPANY OF AMERICA, ALDENE, NEW JERSEY.

(The one-storied portion on the right is the recent extension.)



Collation	TC
To be delivered per post	Poste
Télégraphe restant	TR
Poste restante	GP
Post registered	PR
Poste restante registered	GPR
Telegraphic certificate of arrival	PC
Telegraphic urgent certificate of arrival	PCD
Certificate of arrival by post	PCP
Express messenger	Exprès
All addresses to be stated	CTA

16. The entire charge for radiotelegrams shall include:—

(1) Charge for the radiotelegraphic handling, namely:

(a) "Coast fee," which shall devolve on the coast station.

(b) "Ship fee," which shall devolve on the ship station.

(c) "Transit fee," for the coast or ship stations being intermediary stations at the handling of the telegrams.

(2) Charge for handling over the ordinary telegraph and telephone system paid according to the general regulations.

The coast fee for Danish coast stations shall be 15 ctm. per word.

The ship fee shall be fixed by the owner of the ship station, subject to the approval of the Department of Public Works. It must not exceed 40 ctm. per word; a minimum charge per telegram may, however, be adopted, not exceeding the charge for ten words. Service telegrams concerning the radiotelegraph service are handled without any charge. Service telegrams concerning telegrams handled exclusively per radiotelegraph are handled without any charge between the radiotelegraph stations, but are liable to charge when passing lines of telegraphs. Press telegrams at a reduced charge will not be received.

17. The entire charge for the handling of a radiotelegram from the sender to the addressee is to be collected from the sender by the station where it originates. The stations must not collect larger amounts than allowed in the tariffs.

18. All pecuniary liability in consequence of the operation of the ship stations is payable entirely by the owners of the ship in question, without regard to whether the liability in any case may have been due to fault or neglect on the part of the operators.

19. The original radiotelegrams with the vouchers pertaining thereto must, if possible, be sent once a month by the ship stations to the Telegraph Department.

20. Reimbursement of charges paid, and accounts with the Telegraph Department, are governed by the International Radiotelegraph Service Regulation, Articles XLI and XLII.

IV.—OTHER REGULATIONS.

21. Stations on board ships under foreign flags must not be operated during the time such ships are in a Danish harbour, except to receive, answer and forward messages from ships in distress.

22. When the interests of the State require it, the Government may reserve to itself the right to prohibit all radiotelegraphic communications from ships, Danish or foreign, in Danish waters, and to make the necessary regulations to carry through such prohibition.

23. The maximum penalty payable to the State by the owners or radiotelegraphic company concerned for contravening the foregoing regulations is 400 kroner (£22), and all unlawfully fitted or utilised apparatus may be forfeited. Such contraventions are dealt with in the public police court, and proceedings may only be taken according to demand by the Minister for Public Works.

24. These regulations shall come into force on July 1st, 1913.

C

REGULATIONS

FOR THE ERECTION AND WORKING OF PRIVATE RADIOTELEGRAPHS
(Experimental Stations ; Instructional Stations ; Stations to
Receive Time Signals, Meteorological Reports, etc., etc.).

1. Licence to establish and operate private radiotelegraphs can only be granted to persons above eighteen years of age, who are Danish subjects and have their residence in Denmark. It is not to be expected that the licence, which cannot be transferred to or utilised by others except in accordance with the consent of the Telegraph Department, be granted, unless it is considered to be of actual value to the person concerned or the scientific or technical development of Wireless Telegraphy or Telephony.

Application for the licence drawn up in duplicate and provided with signature is to be sent to the Telegraph Department ; same must contain exact information with regard to the full name, age, residence, previous training, present position, and occupation of the applicant, as well as whether he is a Danish subject or not. The applicant must state exactly the scientific, technical, practical or other purpose for which the erection of the station is intended ; furthermore he must send in a diagram of connections for and a description of the projected station as well as particulars about the energy by which the station is intended to work ; furthermore the name of the wireless land or ship station or stations with which the station of the applicant wants to communicate.

2. It is under no circumstances allowed to transmit telegrams or messages, unless such telegrams and messages have absolute reference to the radiotelegraphic service of the station concerned.

Signals of distress or messages and inquiries concerning assistance or the like, occasioned by disasters at sea form, however, an exception from the above, the station being bound to receive and immediately retransmit such messages to the proper persons by means of its apparatus or in some other way.

3. Communication, experiments and the like, with other wireless stations outside Danish waters is not allowed unless the consent of the Telegraph Department has been previously obtained.

An application to that effect must contain the name, location, and licensee of the foreign land or ship station or stations, with which communication is wanted. A licence, if such one be obtained, does not entitle to communication with other foreign stations than those mentioned in the licence.

4. Stations equipped with transmitters must by no means interfere with the radiotelegraphic communication of other land or ship stations or the public telegraph or telephone traffic. These stations will receive from the Telegraph Department a call signal of their own, and shall answer as soon as this call signal has been observed. Every transmission of signals shall be stopped the moment this is demanded radiotelegraphically or in another way by a Danish wireless land or ship station open to public communication.

5. No transmission of signals must take place until the station has convinced itself that no communication is taking place which might be interfered with by such transmission.

6. The station is liable to be a client of the local telephone net of the place, so that telephonic connection with it can be obtained quickly.

7. The licensee and those persons who are allowed to use the station out of actual instructional purposes must sign a declaration to the effect that they bind themselves to keep secret the contents of such wireless telegrams as might be brought to their knowledge through the wireless station.

These declarations shall be written on special forms, which latter are to be sent to the Telegraph Department duly filled in and signed.

8. In the case of stations equipped with transmitting apparatus the licensee must be familiar with and strictly maintain the Regulations of the International Radiotelegraph Convention and the Service Regulations annexed thereto, in so far as these regulations have reference to the station concerned.

9. Stations equipped with both transmitting and receiving apparatus, which have not been expressly mentioned in the licence as experimental stations, must use in general no other wave-lengths than 200 metres and below. Should it turn out to be necessary—in order to obtain the purposes intended for the erection of the station—to use larger wave-lengths than the above-mentioned, the station shall be exclusively worked by such wireless operators as are holders of a certificate of first or second class as prescribed according to the notification of the Department of Public Works of June 27th, 1913.

The transmission of signals over wave-lengths from 600 to 1,800 metres incl. will entail an immediate withdrawal of the licence.

10. The stations mentioned in Article 9 shall generally not use a larger primary energy than $\frac{1}{2}$ kw. Should the utilisation of a larger energy than the above turn out to be necessary in order to obtain the purpose intended for the erection of the station, the working of same shall be undertaken by a trained wireless operator as mentioned in Article 9.

It is necessary that the primary energy of the station can be read from permanently installed meters.

The utilisation of transmitting apparatus, by which the generation of the transmitted waves takes place by direct discharge of sparks in the antenna is not allowed.

11. Receiving stations, which shall receive nothing but signals (time signals, meteorological reports, and the like) shall be arranged

in such a way as to be able to receive at most only two wave-lengths ; they shall be arranged in such a way that the licensee can only vary the tuning very little from the wave-length or wave-lengths fixed, and the deviation from one wave-length must not exceed 5 per cent. up or down.

The receiving apparatus shall be inclosed in a case in such a way that it can be worked from the outside only by the handle of the tuning contrivance. The shifting of detector and telephone shall, however, take place without it being necessary to open the case, which is to be plumbed by an inspector from the Telegraph Department.

With the exception of the coupling of the detector and telephone, the remaining connections of the receiver—also the connections from the aerial net and water or earth—shall be carried out inside the plumbed case and made so immovable (by soldering together) that a change of the tuning beyond the permissible limits cannot take place.

Later couplings of connections or tuning arrangements are not allowed.

12. When the station is not used and cannot be called, the aerial net (the antenna) must be put direct to a good water or earth connection.

13. The station must not be used until it has been examined by an inspector from the Telegraph Department. If the examination has turned out to be favourable the licensee will receive from the Telegraph Department an information in writing to the effect that the station may be used. An amount of Kr. 10.00 is to be paid for the examination, together with the travelling expenses of the inspector. The amount is to be paid to the Telegraph Department as per bill.

14. Produced under the authority of the Telegraph Department, it will be examined as often as is deemed necessary, whether or not the provisions prescribed for the utilisation of the station are maintained ; in general this examination will take place once a year. The expenses in connection with this examination to be paid by the licensee in accordance with the same rules as are mentioned in Article 13.

15. The installations of the station shall satisfy the provisions being at any time in force for the establishment of similar electric plants, and the necessary notices of warning shall be placarded on all places accessible to strangers. When the plant of a station undergoes a change of some importance, this shall immediately be brought to the knowledge of the Telegraph Department.

16. It is exclusively incumbent on the licensee to pay any damage caused by the plant of the station (apparatus and aerial net) to a person or his property.

17. The conditions prescribed for obtaining a licence to establish and work a station can at any time be supplemented and changed, should circumstances make it necessary.

18. The licence to work a station can be withdrawn at any time and without notice. This will always happen, in case the above conditions for obtaining a licence be not strictly maintained, and the licensee has no right to claim any compensation for the withdrawal of the licence. If the licence be withdrawn the licensee shall—under penalty

pursuant to Act No. 99 of April 19th, 1907, section 6—immediately remove all of the apparatus and antennæ of the station.

Every abuse of the station, every transmission of false signals, or the fact that strangers gain admittance to use the transmitting apparatus of the station, will entail a withdrawal of the licence granted. In such case the offender might even be liable to penalty.

August, 1914.

THE TELEGRAPH DEPARTMENT.

DOMINICAN REPUBLIC

(See SANTO DOMINGO (REPUBLIC OF), page 447).

DUTCH EAST INDIES

(See under NETHERLANDS, page 386).

EAST AFRICA PROTECTORATE

THE territory covered under the above title extends from the Uмба to the Juba River, and inland as far as the borders of Uganda. It includes certain mainland dominions of the Sultan of Zanzibar, these territories having been leased to Great Britain for an annual rent.

The Administration is conducted by a Governor and Commander-in-Chief, assisted by an Executive and a Legislative Council.

Radiotelegraphy is administered under the following :—

WIRELESS TELEGRAPHY ORDINANCE, 1913.

1. This Ordinance may be cited as “The Wireless Telegraphy Ordinance, 1913.”

2. The expression “wireless telegraphy” means any system of communication by telegraph as defined by the Indian Telegraph Act, 1883, without the aid of any wire connecting the points from and at which the messages or other communications are sent and received.

Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. The Governor may, whenever he shall deem it expedient to do so, license the establishment of any wireless telegraph station or the installation or working of any apparatus for wireless telegraphy in any place in the Protectorate or on board any British ship registered in the Protectorate.

4. (1) No person shall establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place in the Protectorate or on board any British ship registered in the Protectorate except under and in accordance with a license granted in that behalf by the Governor.

(2) Every such licence shall be in such form and for such period as the Governor may determine and shall contain such terms, conditions and restrictions on and subject to which the licence is granted as the Governor shall consider desirable in the public interest.

5. (1) If any person establishes a wireless telegraph station without a licence in that behalf or installs or works any apparatus for wireless telegraphy without a licence in that behalf he shall be liable to a fine not exceeding one thousand and five hundred rupees or to imprisonment of either description for a term not exceeding twelve months and in either case be liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence, but no proceedings shall be taken against any person under this Ordinance except with the previous sanction of the Attorney-General.

(2) If a Magistrate is satisfied by information on oath that there is reasonable ground for believing that a wireless telegraph station has been established without a licence in that behalf or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any ship within the jurisdiction without a licence in that behalf he may grant a search warrant to any police officer to enter and inspect the station, place, or ship, and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

6. (1) The Governor may make regulations for all or any of the following matters :—

- (i.) for prescribing the form and manner in which applications for licences under this Ordinance are to be made ;
- (ii.) for prescribing the fees payable on the grant of any licence ;
- (iii.) for regulating the manner in which apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, in the waters of the Protectorate shall be worked so as to prevent interference with naval signalling or the working of any wireless telegraph station lawfully established, installed, or worked in the Protectorate or the waters thereof and so as not to interrupt or interfere with the transmission of any wireless messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea ;
- (iv.) for prohibiting, except with the special or general permission of the Postmaster-General of the Protectorate, the working or using of any apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, whilst such ship is in any of the harbours of the Protectorate ;
- (v.) for prohibiting or regulating in case at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy on board merchant ships, whether British or foreign, in the waters of the Protectorate, the use of wireless telegraphy on board such ships while in such waters by such further rules as the Governor may see fit to make from time to time and either in all cases or in such cases as may be deemed desirable.

(2) Provided that no regulations made in respect of the matters described in paragraphs (iii.) (iv.) and (v.) of this section shall apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

7. When an applicant for a licence proves to the satisfaction of the Governor that the sole object of obtaining the licence is to enable him to conduct experiments in wireless telegraphy a licence for that purpose shall be granted subject to such special terms, conditions, and restrictions as the Governor may think proper, but shall not be subject to any rent or royalty.

8. (1) Every omission or neglect to comply with and every act done or attempted to be done contrary to the provisions of this Ordinance or of any Regulation made thereunder or in breach of the conditions and restrictions subject to or upon which any licence has been issued shall be deemed to be an offence against this Ordinance and for every such offence not otherwise specially provided for the offender shall in addition to the forfeiture of any articles seized be liable to a fine of seven hundred and fifty rupees.

(2) All convictions, forfeitures, and fines under this Ordinance or any Regulations thereunder may be had and recovered before a Magistrate of the first class, and every such Magistrate shall have jurisdiction to pass any sentence authorised by this Ordinance on any European or other Non-Native convicted of an offence against this Ordinance notwithstanding anything in any Ordinance or law limiting the jurisdiction of such Magistrate over Europeans and Non-Natives.

9. The Wireless Telegraph Ordinance, 1908, is hereby repealed :
Provided however—

- (1) Every licence granted under the said Ordinance and in force at the commencement of this Ordinance shall be deemed to have been granted under this Ordinance.
- (2) All Regulations made under the said Ordinance and in force at the commencement of this Ordinance shall be deemed to have been made under this Ordinance and shall continue in force until other provision is made.

EGYPT

WIRELESS Telegraphy is a State monopoly in Egypt in accordance with the following Khedivial Decree dated May 12th, 1906 :—

1. Wireless Telegraphy shall be a State monopoly and no installation shall be established or used except by the Government or with the sanction of the Government.

2. The Minister of Public Works shall be responsible for administration of this law.

Sudan

The Regulations affecting Radiotelegraphy in the Sudan are carried out under an Ordinance issued by Sir Reginald Wingate, the Governor-General, and dated at Khartoum, June 4th, 1906. It runs as follows :—

AN ORDINANCE FOR CONSTITUTING WIRELESS TELEGRAPHY A MONOPOLY OF GOVERNMENT.

No. 2 OF 1906.

This Ordinance may be cited as "The Wireless Telegraph Ordinance, 1906."

No person shall instal or make use of any apparatus for Wireless Telegraphy or transmit or receive messages by means of any such apparatus with the Sudan except the Department of Telegraphs or a duly authorised officer or official of the Sudan Government, unless such person is in possession of a special licence in writing from the Governor-General.

FALKLAND ISLANDS

THIS is a Crown Colony situated in the South Atlantic, 300 miles east of the Magellan Straits. The area covers 6,500 square miles, besides South Georgia 1,000 square miles (estimated), and there are several dependencies—*e.g.*, the South Shetlands, South Orkneys, Sandwich Group, and Graham's Land.

The Administration is conducted by the Governor, assisted by an Executive Council and a Legislative Council.

Radiotelegraphy is administered under the following Act:—

WIRELESS ORDINANCE.

DATED MARCH 15TH, 1912.

The following Ordinance relating to wireless telegraphy came into force on March 15th, 1912:—

1. No person shall establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place or on board any British ship registered in the Colony except under and in accordance with a licence granted in that behalf by the Governor in Council.

2. No person shall work any apparatus for wireless telegraphy installed on any merchant ship (whether British or foreign) whilst that ship is in the territorial waters of the Colony, otherwise than in accordance with regulations made in that behalf by the Governor in Council, and the Governor in Council may, by any such regulations, impose penalties, recoverable before a Stipendiary Magistrate or any two Justices of the Peace in a summary manner, for the breach of any such regulations, not exceeding twenty pounds for each offence, and may provide for the forfeiture of any such breach of any apparatus for wireless telegraphy installed or worked on such ship.

3. If any person establishes a wireless telegraph station without a licence in that behalf or instals or works any apparatus for wireless telegraphy without a licence in that behalf he shall be guilty of a

misdemeanour and be liable on summary conviction thereof to a penalty not exceeding twenty pounds or to imprisonment not exceeding three months, and, on conviction in the Supreme Court, to a fine not exceeding one hundred pounds, or to imprisonment for a term not exceeding twelve months and in either case be liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence.

4. If a Justice of the Peace is satisfied by information on oath that there is reasonable ground for supposing that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship within his jurisdiction without a licence in that behalf or contrary to the provisions of the regulations made under this Ordinance, he may grant a search warrant to any constable or to any officer appointed in that behalf by the Governor and named in the warrant, and a warrant so granted shall authorise the officer named therein to enter and inspect the station, place, or ship and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy.

5. The expression " wireless telegraphy " means any communication by telegraphy without the aid of any wire connecting the points from and at which the messages or other communications are sent and received : Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

6. The Wireless Telegraph Ordinance, 1903, is hereby repealed.

7. This Ordinance may be cited as the Wireless Telegraph Ordinance, 1912.

FIJI

ABOUT 1,100 miles north of New Zealand lies a group of 200 to 250 islands (some merely bare and uninhabited), which cover a square of the South Pacific Ocean about 300 miles each way and constitute the British Colony of Fiji. Their latitude lies from $15^{\circ} 45'$ to $21^{\circ} 10'$ south ; whilst their longitude stretches from $176^{\circ} 0'$ east to $178^{\circ} 0'$ west. The gross area of the group amounts to about 7,435 square miles.

The administration is that of a British Crown Colony, the Governor being assisted by an Executive Council of six and a Legislative Council of twenty members.

The wireless telegraph stations in Fiji are owned and worked by the Colonial Government through the department of Telegraphs and Telephones. The head of this department is Mr. C. C. F. Monckton, M.I.E.E., Superintendent of Telegraphs and Telephones, who is assisted by Mr. W. G. Covell, A.M.I.E.E., Assistant Engineer. The wireless officers are Messrs. W. Kearsley, R. C. Farquhar, H. Roffey, in charge of stations, with Messrs. K. Lawry, J. R. Land, A. O. Barrack, and K. W. A. Black as assistants. The accounting is under the care of Mr. T. J. Davis, accountant of the department.

Stations.—Suvaradio, Labasaradio, and Taviuniradio.

There are no privately owned experimental or amateur stations in the Colony, neither are there any ship stations licensed in Fiji. The Colony contains no wireless clubs or societies.

LAWS AND REGULATIONS.

The first Wireless Telegraph Ordinance was passed in 1903. This was revoked by Ordinance No. XXVI. of 1912 (printed in the YEAR Book for 1917), which was in turn revoked by Ordinance V. of 1913.

The following pages contain the text of :—

A—Ordinance No. V. of 1913.

B—Schedule based thereon.

C—Regulation dated August 18th, 1917.

AN ORDINANCE TO PROVIDE FOR THE REGULATION OF WIRELESS TELEGRAPHY.

Dated June 19th, 1913.

A Be it enacted by the Governor with the advice and consent of the Legislative Council as follows :—

1. This Ordinance may be cited as the Wireless Telegraphy Ordinance, 1913.

2. In this Ordinance "wireless telegraphy" means any system of communication by telegraph without the aid of any wire connecting the points from and at which the messages or other communications are sent or received : Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. (1) A person shall not establish any wireless telegraph station or install or work any apparatus for wireless telegraphy in any place or on board any ship registered in the Colony except under or in accordance with a licence granted in that behalf by the Governor.

(2) Every such licence shall be in such form and for such purpose as the Governor may determine and shall contain the terms conditions and restrictions on and subject to which it is granted.

4. A person shall not work any apparatus for wireless telegraphy installed on any merchant ship whether British or foreign while that ship is in the territorial waters of the Colony otherwise than in accordance with regulations under this Ordinance.

5. (1) The Governor may from time to time make regulations for carrying into effect the purposes of this Ordinance and such regulations shall on publication in the *Gazette* have the same effect as if enacted in this Ordinance.

(2) The regulations in the Schedule to this Ordinance shall have effect except in so far as they may be amended or rescinded by regulations made under the authority of this section.

(3) If at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy the use of wireless telegraphy on board

merchant ships while in the territorial waters of the Colony shall be subject to such further regulations as may be made by the Governor from time to time and such regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

6. If a stipendiary magistrate is satisfied by information on oath that there is reasonable ground for suspecting that a wireless telegraph station has been established without a licence in that behalf or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship without a licence in that behalf or contrary to the provisions of any regulations made under this Ordinance or of any licence granted under this Ordinance he may grant a search warrant to any officer of constabulary or any person appointed in that behalf by the Inspector-General of Constabulary and named in the warrant and a warrant so granted shall authorise the officer of constabulary or person named therein to enter and inspect the station place or ship and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

7. (1) Any person who shall offend against any provision of this Ordinance or any of the regulations made thereunder shall be liable on summary conviction for every such offence to a fine not exceeding fifty pounds and upon such conviction the court may order that any apparatus for wireless telegraphy in connection with which the offence was committed shall be seized and forfeited.

(2) Proceedings shall be taken before a stipendiary magistrate on the complaint of the Inspector-General of Constabulary or of any person thereto authorised by him in writing and the procedure shall be the same as the procedure for the time being in force in respect of offences punishable on summary conviction.

8. The Wireless Telegraphy Ordinance 1912 is hereby repealed.

Passed in Council this twenty-sixth day of May in the year of our Lord one thousand nine hundred and thirteen.

SCHEDULE.

REGULATIONS.

B (i) All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the Colony shall be worked in such a way as not to interfere with :—

(a) Naval signalling ; or

(b) the working of any wireless telegraph station lawfully established installed or worked in the Colony or the territorial waters thereof and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

(ii) In these regulations “ naval signalling ” means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty’s Navy, between ships of His Majesty’s Navy and naval stations, or between a ship of His Majesty’s Navy or a naval station and any other wireless telegraph station whether on shore or on any ship.

(iii) No apparatus for wireless telegraphy on board a merchant ship shall be worked or used while such ship is in any harbour or bay of the Colony except with the special or general permission of the Governor.

(iv) For the purpose of any proceedings under these regulations the master or person being or appearing to be in command or charge of any ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.

(v) Any summons or other document in any proceedings under these regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in command or charge of the ship.

(vi) These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

REGULATIONS MADE BY THE GOVERNOR UNDER SECTION 5 OF ORDINANCE NO. V. OF 1913 REGULATING THE USE OF WIRELESS TELEGRAPHY IN COLONIAL WATERS.

C I. *Wireless Apparatus on Merchant Ships not to Interfere with Naval Signalling or Wireless Stations.*—All apparatus for wireless telegraphy on board a merchant ship in Colonial waters shall be worked in such a way as not to interfere with—

(a) Naval signalling ; or

(b) the working of any wireless telegraph station lawfully established, installed, or worked in the Colony or Colonial waters, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. *Definition.*—In these Regulations naval signalling means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and naval stations, or between a ship of His Majesty's Navy or a naval station and any other wireless telegraph station whether on shore or on any ship.

3. *Operation of Ship Stations in the Harbours of the Colony.*—(a) The radiotelegraph stations on board ships (other than His Majesty's ships of war or Fiji Government vessels) shall not be worked whilst such ships are within the harbours or bays of the Colony except with the special or general permission of the Governor.

(b) For the proper enforcement of the above, ships of British register in the harbours or bays of the Colony must completely disconnect their aerial wires from their radio apparatus, the ends of such wires being suspended entirely clear of the radiotelegraph cabin, preferably from the main rigging, in such a manner as to show they are properly disconnected.

(c) Ships of foreign register in the harbours or bays of the Colony must—subject to the provisions of the following subsection (d)—take down their aerial wires completely and disconnect the same from their radiotelegraph apparatus.

(d) Ships of foreign register remaining in the harbours or bay of the Colony for less than twelve hours may, at the discretion of the Superintendent of Telegraphs and Telephones, be permitted to leave their aerials up, provided the same are disconnected in accordance with the provisions of sub-section (b) of this Regulation.

(e) The operating room of any radiotelegraph station on board ships within Colonial waters (other than His Majesty's ships of war or Fiji Government vessels) may be sealed or any other steps with regard to any such operating room may be taken at the discretion of the Superintendent of Telegraphs and Telephones, and no person shall wilfully resist or obstruct, hinder or molest, or shall incite, assist, or procure others to resist, obstruct, hinder, or molest the Superintendent of Telegraphs and Telephones or his assistants acting under the authority of this Regulation.

4. *Master of Ship to be Responsible.*—For the purpose of any proceedings under these Regulations the master or person being or appearing to be in command or charge of any ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.

5. *Service of Summons.*—Any summons or other document in any proceedings under these Regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in command or charge of the ship.

6. *Saving Clause.*—These Regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

7. *Rescission.*—The Regulations in the Schedule to the Wireless Telegraphy Ordinance 1913 are hereby rescinded.

Made this 18th day of August, 1917.

FRANCE

(Including Algeria and Tunis).

FRANCE is the most westerly of Central European countries. Its latitude lies between $40^{\circ} 29'$ and $51^{\circ} 5' N.$; its longitude between $7^{\circ} 45' E.$ and $4^{\circ} 45' W.$ The area of its 87 departments (including the Isle of Corsica) is estimated at 207,076 square miles.

Its colonial possessions (including Algeria and Morocco) cover a total area of 4,084,410 square miles. Of these Algeria (French since 1830) is reckoned as an integral part of France, the rest being governed as protectorates. Tunis has been a French Protectorate since 1881. The area of French Africa alone is reckoned at 3,812,000 square miles.

The commercial use of wireless telegraphy in France, Algeria and Tunis has been placed under the control of the Minister of Commerce, Industry, Agriculture, Labour, Posts and Telegraphs. The Department of Telegraphs deals with all matters relating to the administration of commercial wireless telegraphy, and this Department also

controls inland and foreign telegraphs. The Ministry of War and the Ministry of Marine control the use of wireless telegraphy in the Army and Navy.

With regard to the other French Colonies, the service in each is organised under a decree of the respective Governors of those Colonies.

Through the courtesy of the French Government we are able to append a general note affecting radiotelegraphy in these Colonies, which will be found at the end of this section.

The administration of radiotelegraphy is governed by two principal enactments, and there have been no recent changes in the Laws and Regulations relating to wireless telegraphy, with the exception of the special regulations made in consequence of war. These regulations, however, have not been published.

The Enactments above referred to consist of :—

A.—Decree dated March 5th, 1907 (modified by subsequent enactments).

B.—Decree dated February 24th, 1917, the text of which will be found below.

A The following are the principal clauses of the Decree dated March 5th, 1907 (modified by the following decrees : April 26th, 1910 ; February 5th, 1911 ; May 27th, 1911 ; November 20th, 1911), which superseded the decrees of February, 1903, and February 27th, 1904 :—

1. Radiotelegraphic stations established or about to be established in France, Algeria and Tunis shall be classified as follows :—

(a) Coast or internal land stations for carrying on commercial service.

(b) Naval coast stations.

(c) Military coast stations.

(d) Lighthouse or lightship stations.

In addition, private stations may be established temporarily when the necessary licences have been obtained.

2. The President of the Council, the Ministries of the Interior, of Public Works, Posts and Telegraphs, of War, Marine, Colonies, Foreign Affairs, Commerce and Industry, Public Instruction and Fine Arts are charged, in so far as concerns their respective departments, with the carrying out of this Decree.

In case of mobilisation the Ministries of Marine and War shall automatically assume control of all stations, without exception.

3. The choice of sites for the proposed range of a station and all technical conditions applicable to each projected station shall be submitted for the consideration of an Inter-ministerial Commission formed in accordance with Article 4 of this Decree. The function of this Commission is to study the various aspects of the services to be carried on and to indicate to the Administrative Departments affected the conditions that are necessary to reconcile their respective interests.

4. The Inter-ministerial Technical Commission shall be appointed by the Minister of Public Works, Posts and Telegraphs, and shall comprise the following members :—

One President and one Vice-President appointed by Presidential decree from the Departments interested.

Three representatives from the Ministry of Marine.

Three representatives from the Ministry of War.

Two representatives from the Colonial Office.

Two representatives from the Foreign Office.

Two representatives from the Ministry of Commerce and Industry.

Two representatives from the Ministry of Public Instruction and Fine Arts.

One representative from the Ministry of the Interior.

Four representatives from the Ministry of Public Works, Posts and Telegraphs, one representing the Department of Public Works and three the Post and Telegraph Administration.

A secretary who shall belong to the Post and Telegraph Administration. He shall have no voting powers.

5. The Commission shall examine the title to sites and technical conditions appertaining to all stations which shall constitute the French radiotelegraphic network; examine complaints regarding French stations; consider such administrative problems concerning the radiotelegraphic service as the Ministry of Public Works, Posts and Telegraphs deems fit to submit to it; institute experiments of general interest. The Commission shall be informed through the departments represented thereon of results obtained by various types of apparatus employed at stations in operation.

6. Except during periods of mobilisation all radiotelegraphic coast stations and stations carrying on commercial services, other than those which exist solely for experimental purposes, shall be open for the transmission of private telegrams.

7. The Post and Telegraph Administration shall be responsible for all matters concerning the collection and taxes, foreign stations, and the International Bureau at Berne. It shall supervise the administration of international regulations in so far as they concern commercial traffic passing through coast stations in France, Algeria and Tunis, as well as through stations on vessels of the mercantile marine.

8. Licences to establish private stations shall be granted by the Post and Telegraph Administration upon the recommendation of the Commission referred to in Article 4. Such licences shall only be of a temporary character, and the stations are strictly forbidden to interfere with the working of other stations.

B Decree of February 24th, 1917, relating to the reception and transmission of radiotelgraphic signals.

ART. I. Private individuals and corporations are forbidden to establish or make use of telegraphic machinery, or apparatus, or any fittings whatsoever capable of transmitting or receiving signals, without the express authorisation of the Minister of Commerce, Industry, Agriculture, Labour, Posts and Telegraphs either on French territory or above that territory, or on board French vessels.

The employment on board foreign vessels in French territorial waters of wireless apparatus, or installations, is forbidden, except in conformity with the rules laid down by the French Government for the employment of such apparatus and installations in the aforesaid territorial waters.

ART. 2. Authorisation for the establishment of a transmitting radiotelegraphic station is only granted to private individuals, or corporations, under the proviso that no let or hindrance shall be able to arise therefrom to the detriment of the working of public stations. The Minister, whenever he shall think fit to authorise (after consultation with the Ministers of War and Marine) the establishment of any proposed station, shall lay down the conditions under which that station shall be erected and worked.

ART. 3. Receiving wireless stations require the same authorisation, under the same conditions as transmitting stations.

It is understood, however, that stations destined for the reception of time and weather signals, whose erection is sought by French citizens, may receive due authorisation by the head of the local Postal and Telegraphic Service when the latter is asked to do so by the parties interested) under the conditions laid down by a Decree of the Minister for Commerce, Industry, Agriculture, Labour, Posts and Telegraphs (after consultation with the Ministers of War and Marine). Special measures may be carried out under the authority of the Ministers of War and Marine in view of the concession in favour of stations of the kind above-mentioned in certain stated districts.

ART. 4. The royalties due from those who have been granted leave to erect stations are fixed by the Ministers of Commerce, Industry, Agriculture, Labour, Posts and Telegraphs and worked in consultation with the Minister of Finance.

Stations for the reception of time and weather signals shall be only liable to payment of a fixed royalty of five francs per year per station.

ART. 5. In times of war—

- (a) All private wireless stations, with the exception of those used by, or on behalf of, military authorities must be dismantled. The owners of such stations must remove the antennæ, and deposit the essential parts of their sending and receiving apparatus in places designated for that purpose by the Postal and Telegraphic authorities.
- (b) The antennæ of wireless stations of mercantile vessels must be dismantled during the whole of the stay of such vessels in French ports and/or territorial waters, unless they have received special authorisation not to do so from the Naval Authority. Moreover, the Marconi Cabin must be locked up and the key placed in the hands of the Master of the vessel. No work (either in the way of overhaul, repair, etc.) may be executed unless the aforementioned officer has assured himself that the work is being carried out by persons authorised to do so.
- (c) It is within the option of the Minister of Commerce, Industry, Agriculture, Labour, Posts and Telegraphs (acting after consultation with the Minister of War and Marine), to prohibit for the time being all manufacture, vending or sale of radiotelegraphic apparatus, except under special licence.

ART. 6. The rules laid down under Chapter V. of the Decree-Law dated December 27th, 1851, are applicable to the conditions laid down by the present Decree.

In times of war any representative of the Minister of War, or the Minister of Marine shall be qualified equally with the Minister himself to institute the proceedings provided for in Art. 10 of the aforesaid Decree-Law.

Moreover, in times of war the War Office and Admiralty shall also have power to take the provisional measures laid down in Art. 12 of the Decree-Law of December 27th, 1851, if in their opinion such measures are matters of urgency.

Statements drawn up by officers of the French Forces, either on land or sea, shall not require to be taken on oath. They are to be viewed as absolutely reliable unless the contrary shall have been proven.

COLONIES OF FRANCE.

(*Not including Algeria and Tunis.*)

The local systems of these Colonies are organised and regulated by their Governor-Generals and the other Administrators affected. Co-ordination in working is secured through the intermediary of the French Colonial Office (Secretarial and Counter-Signatory Departments), to which is attached a Special Committee, entitled the Colonial Committee of Radiotelegraphy, whose business it is to advise on all matters of general concern.

Since the beginning of the war the French Colonies have instituted a number of radio stations, which include the following :—

PAPEETE (Tahiti, South Pacific) which communicates with ships, and with New Zealand and the Samoan Islands.

NOUMEA (New Caledonia), which communicates with ships, and ultimately to Australia.

TOURANE (Annam), for ships' communication.

MUTSAMUDU (Madagascar) for ships' communication and for communication with the Mayotte Island.

FORT DE FRANCE (Martinique), for communication with ships, and ultimately to Demerara.

PORT-VILA (New Hebrides), a joint-station with the British Government under the Condominium, for communication with ships and the neighbouring islands.

Coastal stations are being organised for POINT-A-PITRE (Guadeloupe), DJIBOUTI (Somaliland) and CAYENNE.

In course of erection are high-powered stations at BAMMAKO (on the Niger), at SAIGON (Indo-China), and medium-powered stations on the Congo at BANGUI and in the BRAZZAVILLE district.

Stations either actually at work or on the point of completion are : TIMBUCKTOO, AGADES, BILMA (Saharan District) and a set of nine stations on the northern frontiers of Tonkin and Cambodge (MONCAY, LANGSON, CAO BANG, BAOLAC, HAGIANG, LAOKAY, LUANG-PRABANG, VIEN-TIANE).

Madagascar is proceeding with the organisation of four stations at TANANARIVE, TULLEAR, AMBOHIBE, and MAINTIRANO.

The stations at ATAR and CHINGUETTI (Mauritania) have been opened to the public and are in communication with Senegal *via* Port-Etienne and Rufisque.

GAMBIA

THE Colony of the Gambia was created in 1843, after a long history of trading competition in this locality with the Portuguese and French, dating from the time of Queen Elizabeth. Its separate constitution was inaugurated in 1888. The total area of the various islands and mainland adjacent thereto which go to make up the Colony is estimated at 4,000 square miles. The chief town is Bathurst, situated on the island of St. Mary, at the mouth of the River Gambia, in 13° 24' North latitude.

Ruled as a Crown Colony, the administration is vested in a Governor assisted by two councils, one executive and one legislative, consisting of nominated and elected members.

There are no *privately owned* wireless stations in the Colony, nor are there any *wireless clubs* or *societies* within its *enceinte*.

The rules governing the working of wireless telegraphy in this Colony were originally instituted under the Ordinance (Maintenance of Control) of 12th February, 1903. This has now been repealed and the ruling Ordinance is that of the 22nd September, 1913, entitled "An Ordinance to provide for the Regulation of Telegraphs." The text will be found below. The 1917 rules were passed to cover war conditions.

A.—Ordinance, September 22nd, 1913.

B.—Schedule.

.—Rules under 1913 Ordinance.

D.—Special rules promulgated July, 1917.

A I. This Ordinance may be cited as "The Telegraphs Ordinance, 1913."

II. The words "telegraphy" and "telegraph" mean any system used for conveying, transmitting or distributing electricity or any like agent for the purpose of communication from one point to another.

The expression "wireless telegraphy" means any system of communication by telegraph without the aid of any wire connecting the points from and at which the messages or other communications are sent and received.

III. The Governor may, whenever he shall deem it expedient to do so, license the establishment of any telegraph station, or the installation or working of any apparatus for wireless telegraphy, in any place in the Colony or Protectorate or on board any British ship registered in the Colony.

IV. (1) No person shall establish any telegraph station, or instal or work any apparatus for wireless telegraphy, in any place in the Colony or Protectorate or on board any British ship registered in the Colony except under, and in accordance with, a licence granted in that behalf by the Governor.

(2) Every such licence shall be in such form, and for such period, as the Governor in Council may determine and shall contain such terms, conditions and restrictions on, and subject to, which the licence is granted as the Governor shall consider desirable in the public interest.

V. (1) If any person establishes a telegraph station without a licence in that behalf or installs or works any apparatus for wireless telegraphy without a licence in that behalf he shall be liable to a fine not exceeding one hundred pounds or to imprisonment with or without hard labour for a term not exceeding twelve months and in either case be liable to forfeit any apparatus for telegraphy installed or worked without a licence; but no proceedings shall be taken against any person under this section except with the sanction of the Legal Adviser to the Governor.

(2) If the Chief Magistrate, the Police Magistrate or a Justice of the Peace is satisfied by information on oath that there is reasonable ground for believing that a telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any ship within the jurisdiction without a licence in that behalf, he may grant a search warrant to any Police Officer to enter and inspect the station, place or ship and to seize any apparatus which appears to him to be used, or intended to be used, for telegraphy therein.

VI. (1) The Governor in Council may amend, vary or revoke any of the regulations contained in the Schedule to this Ordinance, and may make regulations for all or any of the following matters:—

(i) prescribing the form and manner in which applications for licences under this Ordinance are to be made;

(ii) prescribing the fees payable on the grant of any licence;

(iii) prohibiting or regulating the use of telegraphy in such telegraph stations, or of wireless telegraphy on board such ships while in such waters, by such further rules as the Governor-in-Council may see fit to make from time to time, and either in all cases or in such cases as may be deemed desirable, if at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over telegraph stations or over the transmission of messages by wireless telegraphy on board merchant ships, whether British or foreign, in the waters of the Colony.

(2) Provided that no regulations made in respect of the provisions in this section contained shall apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

VII. When an applicant for a licence proves to the satisfaction of the Governor that the sole object of obtaining the licence is to enable him to conduct experiments in wireless telegraphy, a licence for that purpose shall be granted subject to such special terms, conditions and restrictions as the Governor may think proper, but shall not be subject to any rent or royalty.

VIII. (1) Every omission or neglect to comply with, and every act done or attempted to be done contrary to the provisions of this Ordinance or of any regulation made thereunder, or in breach of the conditions and restrictions subject to, or upon, which any licence has been issued shall be deemed to be an offence against this Ordinance, and for every such offence not otherwise specially provided for the offender shall, in addition to the forfeiture of any articles seized, be liable to a fine not exceeding fifty pounds or to imprisonment with or without hard labour for a term not exceeding six months.

(2) All convictions, forfeitures and fines under this Ordinance or any regulations made thereunder may be had and recovered before a Court of Petty Sessions.

IX. Nothing in this Ordinance contained shall invalidate or impair any agreement now in force entered into between the Governor of this Colony, or the Imperial Government on behalf of the Government of this Colony, and any Telegraph Company, relative to the laying down or landing of any telegraphic cable, the removal, renewal, maintenance and use thereof, or to the payment of any subsidy to such company by the Government of this Colony or any other the like matter.

X. Nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

XI. The Telegraphic Establishments (Maintenance of Control) Ordinance 1903 is hereby repealed.

* * * * *

To this Ordinance is attached a Schedule which runs :—

THE SCHEDULE.

B “1. All apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, in the territorial waters of the Colony shall be worked in such a way as not to interfere with (a) naval signalling, or (b) the working of any wireless telegraph station lawfully established, installed or worked in the Colony or the territorial waters thereof, or in the Protectorate, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. No apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, shall be worked or used whilst such ship is in any of the harbours of the Colony or Protectorate except with the special or general permission of the Governor.

3. These Regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.”

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It will be noted that under section VI of this Ordinance the Governor-in-Council has power to make regulations. Of those which His Excellency has accordingly promulgated under date of the 28th January, 1914, the text runs as follows :—

RULES MADE BY THE GOVERNOR-IN-COUNCIL UNDER SECTION VI. OF THE TELEGRAPHS ORDINANCE 1913.

C 1. These rules may be cited for all purposes as “The Telegraph Rules, 1914.”

2. The expression “the Company” shall mean any company, corporation or person for the time being engaged in the Colony or Protectorate of the Gambia in transmitting or receiving telegrams.

3. If and whenever in the opinion of the Governor an emergency shall have arisen in which it is expedient for the public service that

the Government of the Colony and Protectorate of the Gambia shall have control over the transmission of telegrams by the Company, it shall be lawful for the Governor by warrant under his hand to direct and authorise such persons as he may think fit to assume the control of the transmission of telegrams by the Company either wholly or partly and in such manner as he may direct, and such persons may enter upon the Company's premises accordingly or the Governor may direct the Company to submit to him or any person authorised by him all telegrams tendered for transmission or received by the Company or any class or classes of such telegrams, and to stop or delay the transmission of any telegrams or deliver the same to him or his agent and generally to obey all such directions with reference to the transmission of telegrams as the Governor may prescribe, and the Company shall obey and conform to all such directions.

Provided always that if default shall be made by the Company in the observance or performance of any provision hereinbefore contained it shall be lawful for the Governor by warrant under his hand to direct and cause so much of the Company's works as are in the Colony or Protectorate of the Gambia or any part of such works to be taken possession of for such services as to the Governor may seem fit, and in that event any person authorised by the Governor may enter upon the offices and works of the Company or any of them and take possession thereof and use the same as aforesaid. Nothing herein contained shall be deemed in any way to prejudice or abridge the power of the Government of the Colony and Protectorate of the Gambia to take possession under or by virtue of any agreement for the time being in force.

4. In any such case as aforesaid if the Company show that during the exercise of any of the powers aforesaid their receipts from the telegraphs with respect to which the said powers have been exercised have been less than their receipts from the same source during a corresponding period on the average of the last preceding three years, the Government of the Colony and Protectorate of the Gambia shall pay to the Company as compensation for any loss of profit sustained by the Company by reason of the exercise by the Governor of any of the powers hereby reserved such sum as may be settled between the Governor and the Company by agreement or as in case of difference may be determined by arbitration. Provided always that no such compensation as aforesaid shall be paid if and so far as the powers hereby reserved to the Governor are exercised for the purpose of preventing direct communication with any of His Majesty's enemies, and save with the consent of the Governor no such compensation shall be paid if and so far as the powers aforesaid are exercised for the purposes of preventing indirect or suspected communication with any of His Majesty's enemies or of protecting the interests of His Majesty under the apprehension of impending war.

5. In estimating such compensation as in the preceding section provided the Arbitrator shall take into account all the circumstances of the case, including not only any such loss as aforesaid but also any additional profit accruing to the Company from the emergency which gave rise to the exercise of the powers aforesaid, and as regards the telegraphs with respect to which the said powers have been exercised

the receipts of the Company on the average of the last preceding three years during a period corresponding to that of the exercise of the said powers shall be deemed to be the receipts which the Company would have taken during the period of the exercise of the said powers had the powers not been exercised.

REGULATIONS MADE BY THE GOVERNOR-IN-COUNCIL
UNDER SECTION VI. OF THE TELEGRAPHS ORDINANCE,
1913.

D 1. These Regulations may be cited as The Wireless Telegraph Regulations 1917.

2. The radio-telegraph stations on board ships (other than His Majesty's ships of war or vessels belonging to or chartered by the Colonial Government) shall not be worked whilst such ships are lying in any of the harbours of the Colony or Protectorate.

3. Ships of British register in the harbours of the Colony and Protectorate shall completely disconnect their aerial wires from their radio-telegraph apparatus, the ends of such wires being suspended entirely clear of the radio-telegraph cabin, if possible from the main rigging, in such a manner as to show they are properly disconnected.

4. Ships of foreign register in the harbours of the Colony and Protectorate shall subject to the provisions of the following Regulation take down their aerial wires completely and disconnect the same from their radio-telegraph apparatus.

5. Ships of foreign register remaining in any harbour of the Colony or Protectorate for less than twelve hours may, by special permission of the Governor, be permitted to leave their aerials up provided the same are disconnected in accordance with the provisions of Regulation 3.

6. The Commissioner of Police or any other person appointed in that behalf by the Governor may at any time in the day or night proceed on board any ship in any of the harbours of the Colony or Protectorate and may place seals upon the radio-telegraph cabin or take any other steps which may be considered necessary to regulate the use of wireless telegraphy on board such ship.

Passed in the Executive Council the Tenth day of July, 1917.

GERMANY

THE German Empire is the youngest of European Governmental Organisations, dating only from April 16th, 1871. The Kingdoms of Prussia, Bavaria, Saxony, and Wurtemberg, together with six Grand Duchies, five Duchies, seven Principalities, and the "Free Towns" of Lubeck, Bremen, and Hamburg elected the King of Prussia as *Deutscher Kaiser*.

Owing to the fact that this Federation of States under Prussian dominance is at war with Great Britain and her Allies, it is not possible to do more than give, as a matter of interest, the Wireless Laws and

Regulations as ruling on the outbreak of hostilities. These appear in accordance with the following list :—

- A—Telegraph Law of the German Empire, April 6th, 1892, March 7th, 1908.
- B—Regulations (Foreign Ships).
- C—Conditions of Concession (Ship Stations).
- D—Regulations (Receiving Stations).
- E—Decree of October 14th, 1913 (Foreign Ships).

A *Sole Article.*—The Act of April 6th, 1892, relating to telegraphs in the German Empire is modified as follows :—

1. Article 3 is completed by the following Paragraph 2 :—
Installations of electric telegraphs for transmission of messages without the aid of metallic wires of junction, shall not be established and worked, except with the authorisation of the State.
2. The following provisions are inserted after Article 3 :
 - (3a) Telegraphic installations which are not exclusively designed for the internal service of a ship, cannot be established and worked on German vessels, unless authorised by the State.
 - (3b) The Imperial Chancellor shall decree the regulations concerning the working of telegraph stations on board foreign vessels in German territorial waters.
3. Article 7 is completed by the following paragraph (2) :
The provision of Paragraph 1, Phrase 1, does not apply till July 1st, 1913, to installations of the nature defined in Article 3, Paragraph 2.

B **T**HE following regulations are decreed for the working of telegraphic installations on board foreign ships in German territorial waters, and are founded on Article 3(c) of the "Telegraph Law of the German Empire," of April 6th, 1892, and March 7th, 1908, and under the reservation of Article 15 of this law :—

1. Ships of war are authorised, in a general manner—
 - (a) To exchange messages, signals, by means of optic and acoustic signals, submarine acoustic signalling excepted.
 - (b) To use wireless telegraphy, on condition that they do not disturb the radiotelegraphic service of the public coast stations, or the service of the coast or ship stations of the Imperial Navy.
- In exchanging messages with German or foreign radiotelegraphic stations, foreign vessels must conform to the regulations of the "Decree for the Regulation of the Radiotelegraphic Service" and to the Decrees which may ultimately be promulgated.
2. Foreign vessels other than ships of war are authorised—till otherwise decreed—
 - (a) To exchange messages by means of optic and acoustic signals, submarine acoustic signalling excepted, and under the reservation that within the illumination zone of the navigable waters of the German coasts and islands the lights of the signal projectors or lanterns must not exceed that prescribed for fixed lights.

- (b) To use wireless telegraphy in conformity with the provisions of the "Decree Regulating the Radiotelegraphic Service" and the decrees which may ultimately be promulgated; nevertheless, in the ports, roadsteads, and estuaries, and in the navigable waterways of the interior, wireless telegraphy can only be used on an authorisation being granted in writing by the Ministry of Posts and Telegraphs of the German Empire.
3. In the public interest the Articles 1 and 2 may be temporarily restricted or suspended.
4. Whosoever works telegraphic installations in a way not authorised by the preceding provisions is liable to fines determined in Article 9 of the "Law of Telegraphs," and in virtue of Article 40 of the Penal Code of the German Empire, all the apparatus designed for the transmission of wireless messages can be confiscated. Moreover, installations which have been worked without a licence can be, in conformity with Article 11 of the "Telegraph Law," removed or rendered unserviceable.

C THE following are some of the principal conditions on which the concession for the installation and working of a radio-telegraph station on board ship is granted :—

1. The concession for the installation and working of the ship station may be withdrawn at any time.
2. The station must fulfil the following requirements :—
 - (a) The construction of the station must be in accordance with modern developments of science and technology.
 - (b) The ship station must be equipped in such a way as to be able to use the two wave lengths of 600 and 300 metres.
 - (c) The waves must be as pure and little damped as possible. The use of sending arrangements, with which the production of the emitted waves takes place by direct sparking discharges of the antenna, is not permitted, except in cases of distress. However, it may be allowed for certain special stations—*e.g.*, for such on small ships—the primary energy of which does not exceed 50 watts.
 - (d) The power transmitted by the radiotelegraphic apparatus, measured at the terminals of the generator, must not under normal conditions exceed one kilowatt.
 - (e) With the reservation of the special provisions concerning the application of the 1,800 m. wave, a power of more than one kilowatt may be used if the ship must maintain communication over a distance exceeding 200 nautical miles from the nearest coast station, or if, in consequence of exceptional circumstances, communication cannot be maintained except by means of an increase of power.
 - (f) The apparatus must be suitable for transmitting and receiving at a speed of at least 20 words per minute, five letters being counted as one word. Installations working with more than 50 watts must be equipped so as to be able to cover several distances within the normal range of transmission, the shortest of which shall be about 15 nautical miles.

- (g) The receiving apparatus must be capable of reception up to 600 miles with the greatest possible protection against disturbances.

3. Ships belonging to the first two categories stated under Article 8, in addition to the ordinary apparatus, must be equipped with emergency gear having an independent source of power and capable of working for at least six hours, with a minimum range of 80 nautical miles in the case of ships in the first category, and of 50 nautical miles of those of the second category. The emergency gear is not necessary in the case of ships whose ordinary plant fulfils the conditions for emergency sets.

The emergency gear, as well as the ship stations themselves, must be placed as high as possible above the deck—viz., according to the structure of the ship and the available space, either equal to the height of the bridge or of the large boat's deck, so that in case of accident they shall be able to remain longest above the water. When using batteries for the emergency plants accumulators may be arranged in the station room itself, whilst acid accumulators, on account of the vapours which they develop, must be placed outside the station room, but in its immediate vicinity, and so that they are protected against outside influences.

4. The contractor must submit to the Imperial Telegraph Administration a description of the ship station, together with a plan of the circuits. Subsequent alterations of the technical equipment affecting transmission or reception must not be made without the consent of the Imperial Telegraph Administration.

5. In order to examine the prescribed arrangement of the ship's station, and the carrying out of the service, the officers of the Imperial Telegraph Administration are permitted at any time to enter the rooms where the apparatus are installed, and to inspect the working equipments.

6. The radiotelegraph service on the ship must be operated only by German subjects.

7. The service of the ship station must be carried out by an operator holding a certificate issued by the Imperial Telegraph Administration, or in an emergency, and for one journey only, by another Government which is a party to the International Radiotelegraphic Convention.

There are two classes of certificates.

The first-class certificate for the capability of the operator, with regard to:—

- (a) The adjustment of the apparatus and knowledge of the methods of working.
- (b) Transmitting of telegrams and receiving by sound at a speed of at least 20 words per minute.
- (c) Knowledge of the regulations applying to the exchange of radiotelegraphic communication.

The second-class certificate may be issued to an operator who attains in transmitting and receiving a speed of 12 to 19 words per

minute, but who fulfils the other conditions mentioned above. Operators holding a second-class certificate may be admitted :—

- (a) On ships which use radiotelegraphy for their own service only and for the exchange of messages of the crew, in particular on fishing vessels.
- (b) On all ships as junior operators, provided that such ships have on board at least one operator holding the first-class certificate. Nevertheless on ships placed in the first category mentioned in Article 8 the service must be carried on by at least two operators holding the first-class certificate.

Transmission may be made only by an operator holding either the first or second class certificate, except in cases of emergency.

8. Ship stations are placed in three categories :—

1. Stations always open.
2. Stations having limited working hours.
3. Stations having no fixed working hours.

During navigation the following must remain permanently on watch :—

1. The stations of the first category.
2. Those of the second category during the hours that they are open for service; out of these hours these stations must remain on the watch for the first ten minutes of each hour.

The stations of the third category are not bound to perform any regular "listening" service.

9. The ship station operator is under the supreme authority of the captain or of the captain's representative, who, in his capacity as superintendent of the ship station, is entitled to note the contents of all telegrams provided he has been placed by the Imperial Telegraph Administration, or, in the case of ships that are permanently abroad, by a German Consulate (General or Vice-consulate), under the obligation of preserving the secrecy of correspondence.

10. The certificate may be withdrawn if, in case of any offences against the "Regulations for the Radiotelegraph Service," the operator has been found guilty after an inquiry.

11. If it is shown that the offence is due to the condition of the apparatus or to instructions given to the operator, the same procedure will be followed in respect of the licence issued to the ship.

12. The certificate may also be withdrawn if it is stated by an officer of the Imperial Telegraph Administration that the operator is no more in possession of the prescribed knowledge and skill. In the latter case a certificate will be granted to the operator after he has successfully passed a further examination.

13. Every change in the staff of the ship station must be reported immediately to the local post office of the home port.

14. The ship station is bound to interchange radiotelegrams with every coast station and with every other ship station, without regard to the particular system of radiotelegraphy employed.

15. The Radiotelegraph Service is regulated in accordance with the rules in the "Instructions for the Radiotelegraph Service." In addition, special instructions which may be issued by the Imperial Telegraph Administration must be observed also.

22. The ship station must be in possession of the certificate from the Imperial Telegraph Administration, stating that the installation and the working of the station have been licensed by the authority named and the category in which the station is placed. This certificate must be kept in the station and presented upon the request of the authorities of the countries at the ports at which the ship calls.

D REGULATIONS have been adopted concerning the installation and working of wireless telegraph receiving stations. The licence, which may be revoked at any time, applies only to the use of stations for receiving time signals from Norddeich, which uses a wave of 1,650 m.

The installation must fulfil the following technical requirements :—

- (a) The receiving apparatus shall be adjusted so that the owner of the station may alter the syntonisation only within the immediate vicinity of the prescribed wave-length. The adjustable wave-lengths shall not differ by more than 5 per cent. above or below the prescribed wave-length.
- (b) The antenna shall not be larger than is necessary for the intended reception.
- (c) The single parts of the oscillatory circuits, also of the antenna circuit, shall be connected firmly and permanently with each other by being soldered together ; exceptions are only admissible at the connecting terminals of the detectors and of the telephone receivers.
- (d) The soldered joints shall be enclosed in casing containing all the parts of the apparatus, and this must be sealed, so that only the handle of the tuning device and the connecting terminals of the detectors and of the telephones are accessible to the owner. For the connection of the antenna wire a sound insulating wrapper shall be used.
- (e) No later connection of circuits or tuning devices shall be permitted.

The controlling officials of the Imperial Telegraph Administration, of the Imperial Naval Administration, and of the Administration of the Army are permitted at any time to enter the premises where the apparatus is situated and to inspect the station and everything appertaining thereto. The licensee is pledged to secrecy in respect of any messages that he may intercept. He must suspend working temporarily when requested to do so by the Imperial Telegraph Administration or the naval or military authorities.

E THE German Official Journal No. 73 of 1913 published a Decree of the Chancellor of October 14th, 1913, referring to the modification of regulations for the working of telegraph stations on foreign ships in German waters. According to these

regulations, wireless telegraphic traffic of foreign ships in German waters and in German rivers is subject to the following :—

- (a) Foreign men of war may use their apparatus on condition that the public coast stations and coast and ship stations of the German marine are not hindered. In exchanging traffic with German or foreign wireless stations the rules laid down in the "Anweisung fuer den Funkentelegraphendienst" (Regulations for the Wireless Telegraph Service) must be followed.
- (b) Other foreign craft are only permitted to use their wireless apparatus in accordance with the above-mentioned regulations, but within German ports, roadsteads, river mouths, as well as within inner waterways, wireless apparatus may only be used with the written permission of the German Postal Authorities.

GIBRALTAR

(Lat. $36^{\circ} 6' 23$ N. ; Long. $5^{\circ} 20' 55$ W.)

PERHAPS nowhere in the world has more romance been crowded into a tiny piece of territory than is the case with the rocky promontory, $2\frac{1}{2}$ miles long by $\frac{3}{4}$ mile broad, which we know as Gibraltar. Its name (*Gebel-Tarik*, the Rock of Tarik, a famous Mohammedan Conqueror) is simply crystallised history. British since 1713, its famous $3\frac{1}{2}$ years siege ended in 1783.

In this essentially naval and military station, the Commander-in-Chief acts as Governor, exercising autocratically both administrative and legislative functions.

There are no commercial wireless telegraph stations in Gibraltar, and the right to use wireless telegraphy is reserved to the Government. Private wireless of any description, whether amateur, commercial, or experimental, is strictly forbidden; not only the control, but the possession and working of radiotelegraphy, being exclusively vested in military or naval hands.

We print below the ruling Ordinances and regulations :—

A—Wireless Telegraph Apparatus Ordinance, 1903 and 1909.

B—Wireless Telegraph Apparatus Further Amendment Ordinance, 1909.

C—Rules as to use on Merchant Ships.

The following Ordinance to prohibit the importation, keeping, use or establishment of any apparatus or installation for transmission of messages by wireless telegraphy by unauthorised persons in Gibraltar came into force on October 20th, 1903. This Ordinance has been amended by the Wireless Telegraph Apparatus Amendment Ordinance, 1909 (February 3rd), and in the text below the amending words are shown in brackets :

A 1. This Ordinance may be cited as "The Wireless Telegraph Apparatus Ordinance, Gibraltar, 1903."

2. No person shall import, keep, use or establish in Gibraltar [*or on board any British ship registered in Gibraltar*] any apparatus or installation for the receipt or transmission of messages by wireless telegraphy without the licence in writing of the Governor, and under such terms and conditions as may be prescribed in such licence, which licence the Governor may in his discretion at any time cancel and revoke.

3. It shall be lawful for the Governor by order in writing to authorise the Chief of Police or any other person named by him in such order to enter at any time by day or night and by force, if necessary, any premises or place [*or any ship*] in Gibraltar, and to search for any such apparatus or installation as described in this Ordinance, and to seize and remove the same to be dealt with in such manner as the Governor may direct.

4. Any person offending against this Ordinance, or resisting or in any way interfering with any person charged with the execution of an order issued by the Governor under the preceding section, may be arrested without warrant and shall be liable on conviction by a Court of Summary Jurisdiction to a penalty not exceeding £50, or to imprisonment with or without hard labour for any term not exceeding three months.

5. All penalties under this Ordinance shall be recoverable summarily in manner directed by "The Justices Ordinance, Gibraltar, 1890."

B

The "Wireless Telegraph Apparatus Further Amendment Ordinance, Gibraltar, 1909" (April 30th), contains the following clause :—

2. A person shall not work any apparatus for wireless telegraphy installed on merchant ships, whether British or foreign, while in Gibraltar otherwise than in accordance with rules made in that behalf by the Governor, and the Governor may, by any such rules, impose penalties recoverable summarily for the breach of any such rules, not exceeding ten pounds for each offence, and may provide for the forfeiture on any such breach of any apparatus for wireless telegraphy installed or worked on such ships. All such rules shall be published in the Official Gazette and after such publication shall have the same force and effect as if enacted in this Ordinance.

C

The following Rules as to the use of wireless telegraph apparatus on merchant ships, whether British or foreign, while in Gibraltar, were made on May 3rd, 1909, under "The Wireless Telegraph Apparatus Further Amendment Ordinance, Gibraltar, 1909" :—

1. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of Gibraltar shall be worked in such a way as not to interfere with (a) Naval signalling, or (b) the working of any wireless telegraph station lawfully established, installed or worked in Gibraltar or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used whilst such ship is in any of the harbours or Gibraltar, except with the special or general permission in writing of the Governor.

3. If at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by

wireless telegraphy the use of wireless telegraphy on board merchant ships whilst in the territorial waters shall be subject to such further rules as may be made by the Governor from time to time, and such rules may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

4. These rules shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

5. Any person offending against any of these rules shall be liable to a penalty not exceeding ten pounds for each offence recoverable summarily under "The Justices Ordinance, Gibraltar, 1890," and any apparatus for wireless telegraphy installed or worked on such ship may be forfeited to His Majesty.

GOLD COAST COLONY

THE Gold Coast Colony comprises the coast of the Gulf of Guinea from about longitude $3^{\circ} 7' W.$ to $1^{\circ} 14' E.$ of Greenwich; with a protectorate extending inland to an average distance of 440 miles or to the 11° of N. latitude. It is bounded on the west and north by the French colonies of the Ivory Coast and French Sudan, and on the east by the ex-German colony of Togoland. The natives are almost all Pagans, but Mohammedanism and Christianity are steadily gaining ground. English merchants started trading at Kormantyne on this coast in 1618, and Chartered Companies subsequently took up the task of organising British trade. Their settlements were in 1821 transferred to the Crown, and a separate establishment under the title of Gold Coast Colony was created in 1874. The seat of Government is at Accra, and the administration is conducted by a Governor, aided by a nominated executive Council, and by a legislative Council of six official and four unofficial members. Radiotelegraphy was introduced in 1912, and in 1913 the Accra station was completed.

There are no privately-owned experimental or amateur stations; neither are there any wireless clubs or societies. In fact, no licences have been issued to any classes of individual or corporations, radiotelegraphy in this Colony being still in its infancy.

The officials administering wireless arrangements are :—

S. B. Gosling, Postmaster-General.

Major J. F. O'Shaughnessy, Engineer-in-Chief of Posts and Telegraphs Department.

Both of these gentlemen reside at Accra, and are assisted by two European operators—Mr. L. C. C. Miles and Mr. P. McC. Connolly.

The first act to regulate radiotelegraphy in this Colony was "The Wireless Telegraphy Ordinance, 1903." This was followed by the "Wireless Telegraphy (Amendment) Ordinance, 1913" (see the WIRELESS YEAR BOOK for 1915). These Ordinances, however, were both of them repealed by "The Wireless Telegraphy Ordinance No. 15 of 1913," which is the extant Government Ordinance as at present administered, and the text thereof will be found below.

Annexed to this Ordinance are Regulations applying to Merchant Ships, whereof the text appears below. In 1917 the Government

promulgated Rules for the Regulation of Wireless Telegraphy within its territorial waters. These rules also figure in the following pages :—

The Laws and Regulations here printed are :—

A—Wireless Telegraphy Ordinance, No. 15, of 1913 (dated October 4th, 1913).

B—Regulations (Merchant Ships).

C—Rule No. 17 of 1917.

A n Ordinance (No. 15) to provide for the regulation of Wireless Telegraphy, 4th October, 1913.

Be it enacted by the Governor of the Gold Coast Colony, with the advice and consent of the Legislative Council thereof, as follows :—

1. This Ordinance may be cited as “ The Wireless Telegraphy Ordinance, 1913.”

2. In this Ordinance “ Wireless Telegraphy ” means any system of communication by telegraphy without the aid of any wire connecting the points from and at which the messages or other communications are sent or received : Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. (1) A person shall not establish any wireless telegraph station or install or work any apparatus for wireless telegraphy in any place or on board any ship registered in the Colony except under and in accordance with a licence granted in that behalf by the Governor.

(2) Every such licence shall be in such form and for such period as the Governor may determine, and shall contain the terms, conditions, and restrictions on and subject to which it is granted.

4. A person shall not work any apparatus for wireless telegraphy installed on any merchant ship, whether British or Foreign, while that ship is in the Colonial waters otherwise than in accordance with regulations under this Ordinance.

5. (1) The Governor may from time to time make regulations for carrying into effect the purposes of this Ordinance, and such regulations shall on publication in the *Gazette* have the same effect as if enacted in this Ordinance.

(2) The regulations in the Schedule to this Ordinance shall have effect except in so far as they may be amended or rescinded by regulations made under the authority of this section.

(3) If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the Colonial waters shall be subject to such further regulations as may be made by the Governor from time to time, and such regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

6. If a Magistrate or District Commissioner is satisfied by information on oath that there is reasonable ground for suspecting that a wireless telegraph station has been established without a licence in that behalf,

or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship without a licence in that behalf or contrary to the provisions of any regulations made under this Ordinance or of any licence granted under this Ordinance, he may grant a search warrant to any Commissioner or Assistant Commissioner of Police or any person appointed in that behalf by the Commissioner of Police and named in the warrant and a warrant so granted shall authorise the Commissioner or Assistant Commissioner of Police or person named therein to enter and inspect the station, place or ship and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

7. (1) Any person who shall offend against any provision of this Ordinance or any of the regulations made thereunder shall be liable on summary conviction for every such offence to a fine not exceeding fifty pounds, and upon such conviction the Court may order that any apparatus for wireless telegraphy in connection with which the offence was committed shall be seized and forfeited.

(2) Proceedings shall be taken before a District Commissioner's Court on the complaint of a Commissioner or Assistant Commissioner of Police or of any person thereto authorised by the Commissioner of Police in writing, and the procedure shall be the same as the procedure for the time being in force in respect of offences punishable on summary conviction.

8. The Wireless Telegraphy Ordinance, 1903, and The Wireless Telegraphy (Amendment) Ordinance, 1913, are hereby repealed.

REGULATIONS.

B (i) All apparatus for wireless telegraphy on board a merchant ship in the Colonial waters shall be worked in such a way as not to interfere with—

(a) Naval Signalling, or

(b) The working of any wireless telegraph station lawfully established, installed, or worked in the Colony or the Colonial waters and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

(ii) In these Regulations "Naval Signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and Naval Stations, or between a ship of His Majesty's Navy or a Naval Station and any other wireless telegraph station whether on shore or on any ship.

(iii) No apparatus for wireless telegraphy on board a merchant ship shall be worked or used while such ship is in any harbour port or bay of the Colony except with the special or general permission of the Governor.

(iv) For the purpose of any proceedings under these regulations the master or person being, or appearing to be, in command or charge of any ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.



INSIDE THE MARCONI WIRELESS TELEGRAPH COMPANY OF AMERICA'S NEW WORKS AT ALDENE (N.J.): THE LATHE SHOP.

[To face page 292.]

(v) Any summons or other document in any proceedings under these regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being, or appearing to be, in command or charge of the ship.

(vi) These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

RULE NO. 17 OF 1917.

C Under and by virtue of section 8 of the Defence of the Colony Ordinance, 1914, I, Sir Hugh Charles Clifford, Knight Commander of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief of the Gold Coast Colony, with the advice of the Executive Council of the said Colony, do hereby make the following rules which I, with the advice aforesaid consider necessary for the public safety and the Defence of the Colony.

1. The radiotelegraph stations on board ships (other than His Majesty's ships of war) shall not be worked, except for the reception of messages whilst such ships are within any harbour port or within any roadstead within the Colonial waters of the Colony.

2. For the proper enforcement of the last preceding rule.

(a) The master of every ship of British or Allied register whilst in any such harbour port or roadstead shall cause the sending and transmitting portion of the radio apparatus on such ship to be disconnected and to be kept disconnected from the dynamo, accumulators, or other source of electrical power available, so that radio messages cannot be sent from the ship.

(b) If an officer appointed in writing by the Postmaster-General to examine the wireless apparatus on any ship shall so order, the master of such ship within such harbour port or roadstead shall cause all portions of the radio apparatus on such ship to be disconnected or sealed in such manner as such officer shall order, and shall cause the same to be kept so disconnected or sealed while such ship is within such harbour port or roadstead.

(c) The master of a ship of neutral register shall immediately on arrival in any such harbour port or roadstead cause the aerial wires to be taken down completely and disconnected from the radiotelegraph apparatus on such ship and shall cause such wires to remain so down and disconnected while such ship is in such harbour, port or roadstead, and shall cause the operating room to be sealed and kept sealed and such other steps to be taken as any officer appointed by the Postmaster-General for the purpose may order.

Made at a meeting of the Executive Council held at Government House, Accra, this 1st day of September, 1917.

(Signed) HUGH CLIFFORD,
Governor.

GREAT BRITAIN

THE more correct title for the heart of the British Empire is that of the "United Kingdom," for just as we are a mixture of races, so are we also a mixture of nationalities. Wales was linked with England in the thirteenth century under Edward I., and in the Tudors has contributed a line of kings to the British throne. The Scotch joined hands with the English under James VI. of Scotland and First of England, the Stuart Dynasty originating in the Northern Kingdom. Ireland remained a separate entity until the Act of Union, which came into force on January 1st, 1801.

The total area of the British Isles is reckoned at 121,377 square miles, whilst in 1914 the population numbered 46,500,000. In the same year there were 23,701 miles of railway and 2,886,025 miles of telegraphic and telephonic wires (exclusive of wireless aerials).

Our own country is proud to share with Italy in the production of Senatore Marconi. If his father was Italian, his mother was Irish; and if Italy was the place of his birth, England has been the home of his adoption and the chief scene of his labours. The first British patent for Wireless Telegraphy was No. 12,039, lodged by the Italian inventor in 1896. Ever since that date the United Kingdom has been in the forefront of wireless activities, and British radiotelegraphy is continually expanding in all directions. Details are naturally impossible under war conditions, but it is an open secret that scientists in general will themselves be astonished on the return of peace to find the progress that has been made with inventions, applications, and installations.

The Postmaster-General is responsible for the administration of wireless telegraphy in Great Britain and Ireland.

The following are the officers who form the Department of Wireless Telegraphs at the General Post Office, London, E.C.:—Postmaster-General, Rt. Hon. A. H. Illingworth, M.P., P.C.; Secretary to Post Office, George Evelyn P. Murray; Assistant Secretary, E. W. Farnall, C.B.; Principal Clerk, F. J. Brown; First Class Clerk, J. I. De Wardt.

Department of the Inspector of Wireless Telegraphy:—Inspector of Wireless Telegraphy, Commander F. G. Loring, R.N., M.I.E.E.; Deputy Inspector of Wireless Telegraphy, Major C. G. C. Crawley, R.M.A., M.I.E.E.; Assistant Inspectors, F. Addey, B.Sc.Lond., A.M.I.E.E., and O. F. Brown, M.A., B.Sc.Oxon., B.Sc.Lond.

Early in 1914 a Bill was presented to the House of Commons by the President of the Board of Trade to amend the laws relating to merchant shipping so as to give effect to the International Convention for the Safety of Life at Sea, signed at London on January 20th, 1914. Under the title "Merchant Shipping (Convention) Act, 1914," this Bill was passed in August, 1914, and was due to come into force on July 1st, 1915, but has not yet been put into operation. Part III. of the Act refers to wireless telegraphy and is to be found on page 312.

At the outbreak of war all wireless stations in the British Empire were brought under the control of the Government, and in the following pages we have included the notices which were published in the *London Gazette* of August 2nd and 3rd, 1914, and also an extract from the Defence of the Realm (Consolidation) Regulations, 1914, which relates to the prohibition of the possession of wireless telegraphic apparatus,

unless with the official permission of the Postmaster-General. All amateur and experimental stations have been closed, and there is no probability of their being re-opened until the end of the war, when it is anticipated that the provisions of the licences will be considerably revised. For this reason we have not included the particulars of these licences in the following pages, but they are to be found in the *YEAR-BOOK* for 1914 (pp. 183-188).

The Defence of the Realm Act receives amendments from time to time, applying now to one section, now to another. Regulation 37B is devoted to Wireless Telegraphy, and in July, 1916, was amended by a clause (the text of which we reprint here) providing for the obligatory installation of wireless on every vessel of 3,000 tons or over registered at a British port. This has been further amended in October, 1917, to cover British vessels of 1,600 tons and over. This new amendment will be found in the following pages.

The following is the list of items to be found below :—

- A—Wireless Telegraphy Act, 1904.
- B—Order in Council, February 29th, 1908.
- C—Wireless Telegraphy (Foreign Ships) Regulations, 1908.
- D—Ship Stations Licence.
- E—Private Business Licence.
- F—Board of Trade Notice (Signalling Practice).
- G—Merchant Shipping (Convention) Act, 1914. (Part III.)
- H—Notices in the *London Gazette*, 1914.
- I—Defence of the Realm Regulations, 1914.
- J—Proclamation extracted from *London Gazette*, July 28th, 1916.
- K—Amendment to Defence of Realm Act, dated October 23rd, 1917.

Wireless Telegraphy Act, 1904.

A Following the termination of the meeting of the delegates at the international Conference in Berlin in 1903, the British Government drafted a Wireless Telegraph Act to define the official position of the Postal and Telegraph Department in the United Kingdom in regard to the new development. The Act received Royal assent on August 15th, 1904, and the text is as follows :—

1. (1) A person shall not establish any wireless telegraph station, or instal or work any apparatus for wireless telegraphy, in any place or on board any British ship except under and in accordance with a licence granted in that behalf by the Postmaster-General.

(2) Every such licence shall be in such form and for such period as the Postmaster-General may determine, and shall contain the terms, conditions, and restrictions on and subject to which the licence is granted, and any such licence may include two or more stations, places, or ships.

(3) If any person establishes a wireless telegraph station without a licence in that behalf, or instal or works any apparatus for wireless telegraphy without a licence in that behalf, he shall be guilty of a misdemeanour, and be liable, on conviction under the Summary Jurisdiction Acts, to a penalty not exceeding ten pounds, and on

conviction on indictment to a fine not exceeding one hundred pounds, or to imprisonment, with or without hard labour, for a term not exceeding twelve months, and in either case be liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence, but no proceedings shall be taken against any person under this Act except by order of the Postmaster-General, the Admiralty, the Army Council, or the Board of Trade.

(4) If a justice of the peace is satisfied by information on oath that there is reasonable ground for supposing that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any ship within his jurisdiction without a licence in that behalf, he may grant a search warrant to any police officer or any officer appointed in that behalf by the Postmaster-General, the Admiralty, the Army Council, or the Board of Trade, and named in the warrant, and a warrant so granted shall authorise the officer named therein to enter and inspect the station, place or ship, and to seize any apparatus which appears to him to be used, or intended to be used, for wireless telegraphy therein.

(5) Sections 684, 685, and 686 of the Merchant Shipping Act, 1894 (which relate to the jurisdiction of courts and justices), and section 693 of the same Act (which relates to distress for sums ordered to be paid by masters and owners of ships), shall apply to the jurisdiction of courts and justices in respect of ships, and to distress under this Act.

(6) The Postmaster-General may make regulations for prescribing the form and manner in which applications for licences under this Act are to be made, and, with the consent of the Treasury, the fees payable on the grant of any such licence.

(7) The expression "wireless telegraphy" means any system of communication by telegraph as defined in the Telegraph Acts, 1863 to 1904, without the aid of any wire connecting the points from and at which the messages or other communications are sent and received: Provided that nothing in this Act shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

2. (1) Where the applicant for a licence proves to the satisfaction of the Postmaster-General that the sole object of obtaining the licence is to enable him to conduct experiments in wireless telegraphy, a licence for that purpose shall be granted, subject to such special terms, conditions, and restrictions as the Postmaster-General may think proper, but shall not be subject to any rent or royalty.

(2) Where an applicant for a licence satisfies the Postmaster-General that a wireless telegraph station is to be used solely for the transmission of telegrams which are within the first or second exception from the exclusive privilege of transmitting telegrams conferred upon the Postmaster-General by the Telegraph Act, 1869, a licence for that purpose, if granted, shall not be subject to any rent or royalty.

(3) It shall be lawful for the Postmaster-General, due regard being had to the maintenance and exercise of effective control over wireless telegraphy, to grant special licences at reduced terms for the establish-

ment and working of wireless telegraph stations to be used exclusively for the transmission within the United Kingdom of news to public registered newspapers. A schedule of all reduced rents or royalties imposed by any special licences shall be laid before both Houses of Parliament within fourteen days of the commencement of the session next succeeding the grant of any such licences.

3. (1) This Act may be cited as the Wireless Telegraphy Act, 1904, and may be cited with the Telegraph Acts, 1863 to 1904.

(2) This Act shall extend to the whole of the British Islands and to all British ships in the territorial waters abutting on the coast of the British Islands, and the Royal Courts of the Channel Islands shall register this Act accordingly.

(3) His Majesty in Council may order that this Act shall, subject to any conditions, exceptions, and qualifications contained in the order, apply during the continuance of the order to British ships whilst on the high seas.

(4) A person shall not work any apparatus for wireless telegraphy installed on a foreign ship whilst that ship is in territorial waters otherwise than in accordance with regulations made in that behalf by the Postmaster-General, and the Postmaster-General may, by any such regulations, impose penalties recoverable summarily for the breach of any such regulations not exceeding ten pounds for each offence, and may provide for the forfeiture on any such breach of any apparatus for wireless telegraphy installed or worked on such ship. Save as aforesaid, nothing in this Act shall apply to the working of apparatus for wireless telegraphy installed on any foreign ship.

4. In the application of this Act to Scotland the expression "Misdemeanour" means crime and offence.

5. In the application of this Act to the Channel Islands and the Isle of Man—

(1) The Lieutenant-Governor of the Island of Jersey or the Island of Guernsey, and the Governor, Lieutenant-Governor, or Deputy-Governor of the Isle of Man, as the case may require, shall be substituted for the Board of Trade.

(2) Offences may be prosecuted, fines recovered, proceedings taken, and search warrants issued in such courts and in such manner as may for the time being be provided in the Channel Islands and the Isle of Man by law, or if no express provision is made then in and before the courts and in the manner in which the like offences, fines, proceedings, and warrants may be prosecuted, recovered, taken, or issued therein by law, or as near thereto as circumstances admit, and the bailiff or his lieutenant, or any jurat of the Royal Court in the Island of Jersey or the Island of Guernsey, and the judge or any jurat of the Court of Alderney, and the high bailiff or two justices of the peace in the Isle of Man, shall respectively be substituted for a justice of the peace.

6. This Act shall continue in force until the thirty-first day of July, nineteen hundred and six, and no longer, unless Parliament otherwise determines. (It was renewed until December 31st, 1909, and has since been extended from year to year by the Expiring Laws Continuance Act.)

B The following Order in Council is dated February 29th, 1908 :—

(1) The Wireless Telegraphy Act, 1904, shall apply to British ships whilst on the high seas, provided that a person on board a British ship which is registered in any British possession (other than the Channel Islands and the Isle of Man), or in any British Protectorate, shall not be deemed to commit an offence against the Wireless Telegraphy Act, 1904, by reason of the installation or working of wireless telegraphy on such ship if the authority in such Possession or Protectorate, having power by law so to do, shall have granted a licence for the installation and working of apparatus for wireless telegraphy on that ship, and if such person is acting in accordance with the provisions of such licence.

(2) The Interpretation Act, 1889, shall apply for the purpose of the interpretation of this Order as it applies for the purpose of the interpretation of an Act of Parliament.

(3) This Order shall be published in the *London Gazette*, and shall come into operation immediately from and after the expiration of three months after this Order is so published.

(4) This Order may be cited as "The Wireless Telegraphy Order, 1908."

C An Order was issued in 1908 (No. 496) containing regulations relating to foreign ships :—

1. In these Regulations unless the context otherwise requires—

"Wireless Telegraphy" has the same meaning as in the Wireless Telegraphy Act, 1904.

"Naval Signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and Naval Stations, or between a ship of His Majesty's Navy or a Naval Station and any other wireless telegraph station whether on shore or on any ship.

"Territorial Waters" means such part of the sea adjacent to the coast of the British Islands as is deemed by international law to be within the territorial sovereignty of His Majesty, and includes harbours.

"Harbour" includes harbours properly so called, whether natural or artificial estuaries, navigable rivers, piers, jetties, and other works in or at which ships can obtain shelter, or ship and unship goods or passengers.

2. When communications are made by means of wireless telegraphy between a foreign ship in territorial waters and a wireless telegraph station in the British Isles, the rules in force for the working of wireless telegraphy at that station shall be observed.

3. All apparatus for wireless telegraphy on board a foreign ship in territorial waters shall be worked in such a way as not to interrupt or interfere with—

(a) Naval Signalling, or

(b) the working of any wireless telegraph station lawfully established, installed, or worked in the British Islands or the territorial waters abutting on the coast of the British Islands,

and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

4. (1) Except with the special permission in writing of the Postmaster-General no apparatus for wireless telegraphy on board a foreign ship (other than a ship of war) shall be worked or used whilst such ship is in any harbour in the British Islands.

(2) Without prejudice to the operation of the general provisions of these Regulations, the use of wireless telegraphy on board a foreign ship of war while in a harbour in the British Islands shall be subject to such rules (whether prohibitive or regulative) as may be made by the Admiralty from time to time.

5. (1) If at any time in the opinion of one of His Majesty's Principal Secretaries of State an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, and notice to that effect is published by the Postmaster-General, after the publication of such notice and until further notice the use of wireless telegraphy on board foreign ships whilst in territorial waters shall be subject to such rules as may be made by the Admiralty from time to time, and such rules may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

(2) Such notice as aforesaid shall be published in the *London Gazette*, the *Edinburgh Gazette*, and the *Dublin Gazette*, and in such other manner, if any, as to the Postmaster-General may seem fit.

6. (1) Any person who shall offend against any provision of these Regulations or of any Rules made by the Admiralty thereunder shall be liable on conviction under the Summary Jurisdiction Acts for every such offence to a penalty not exceeding ten pounds, and upon such conviction the Court may order that any apparatus for wireless telegraphy installed or worked on board the ship on which the offence was committed shall be seized and forfeited.

(2) For the purposes of any proceedings under these Regulations the master or person being or appearing to be in command or charge of any Foreign ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.

(3) Any summons or other document in any proceedings under these Regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in command or charge of the ship.

7. These Regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

8. These Regulations shall come into operation on the first day of July, 1908.

9. These Regulations may be cited as "The Wireless Telegraphy (Foreign Ships) Regulations, 1908."

D The following is a copy of the form of Licence granted by the Postmaster-General to establish Wireless Telegraph Ship Stations :—

LICENCE TO ESTABLISH WIRELESS TELEGRAPH SHIP STATIONS.

To all to whom these Presents shall come

I, The Right Honourable

His Majesty's Postmaster-General, send greeting :

Whereas by reason of the provisions of the Telegraph Acts 1863 to 1916 and the Wireless Telegraphy Order 1908 it is unlawful to establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place or on board any British ship (whether in the territorial waters of the British Islands or on the high seas) except under and in accordance with a licence granted in that behalf by the Postmaster-General :

And whereas — (hereinafter called the Licensee) has applied to the Postmaster-General for the grant of a Licence to establish instal and work apparatus for wireless telegraphy as defined in Section 1 (7) of the Wireless Telegraphy Act 1904 at the ship station or stations mentioned in the Schedule hereto.

Now I the above-named — His Majesty's Postmaster-General in exercise of all powers and authorities enabling me in this behalf do hereby grant to the Licensee during the term or period commencing on the day of the date hereof and continuing thereafter so long as the Defence of the Realm (Consolidation) Regulations 1914 shall remain in force licence and permission—

(i) To establish instal and work for the purposes hereinafter mentioned at the ship station or stations specified in the Schedule hereto apparatus for wireless telegraphy of the kind specified in the Schedule hereto (which apparatus is hereinafter referred to as "the licensed apparatus") :

Provided that—

(a) Each ship station shall be of such class mentioned in Article XIII. of the Service Regulations annexed to the Radiotelegraph Convention 1912 as is specified in the said Schedule opposite to the name of such station :

(b) The apparatus installed at each ship station shall be of the character specified in the said Schedule opposite to the name of such station ;

(c) The sending apparatus used at each ship station shall be of such a character that the waves emitted are as pure and as little damped as possible and the receiving apparatus used at the said station or stations shall be of such a character as to afford the greatest possible protection from disturbance during the reception of signals ;

(d) The apparatus shall include such emergency installation as may be required according to the class of the ship station under the provisions of Article XI. of the Service Regulations annexed to the Radiotelegraph Convention 1912 ;

(e) The licensed apparatus shall be so constructed as to be capable of using wave-lengths of 600 and 300 metres in length as measured by the standard of measurement in use by the Post Office for the time being and such other wave-lengths not exceeding 600 metres in length as shall be authorised in writing from time to time by the Postmaster-General. Provided always that the wave-length of 600 metres shall normally be used for communication and further that the wave-length of 1,800 metres may be used for transmission in the exceptional case contemplated by Article XXXV (2) (a) of the Service Regulations annexed to the Radiotelegraph Convention 1912 ;

Provided further that only the wave-length of 600 metres (except as directed by the Admiralty) shall be used by the Licensee during the period of any war in which the United Kingdom is engaged ;

(f) The apparatus shall admit of the transmission and reception of messages at the rate of not less than 20 words a minute five letters being counted as one word ;

(ii) To send and receive messages by means of the licensed apparatus between the said ship stations and also between the said ship stations and coast stations and other ship stations. Provided that the Licensee shall not except with the consent in writing of the Postmaster-General send or receive messages from and at the said ship stations when in any harbour in the British Islands ; and

(iii) To receive money or other valuable consideration for or in respect of the use of the licensed apparatus or for or in respect of the transmission or receipt of messages by means of the said apparatus.

And I do hereby declare that the said licence and permission is granted on and subject to the following conditions and provisions :

1. In these presents (and in the Schedule hereto) the following words and expressions shall have the several meanings hereinafter assigned to them unless there be something either in the subject or context repugnant to such construction (that is to say) :—

The expression “ the Postmaster-General ” means the Postmaster-General for the time being.

The expression “ wireless telegraphy ” has the same meaning as in the Wireless Telegraphy Act 1904.

The term “ telegraph ” has the same meaning as in the Telegraph Act 1869.

The expression “ Naval signalling ” means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy between ships of His Majesty's Navy and Naval Stations or between a ship of His Majesty's Navy or a Naval Station and any other wireless telegraph station whether a coast station or a ship station.

The expression “ the Admiralty ” means the Commissioners for executing the office of Lord High Admiral of the United Kingdom of Great Britain and Ireland.

The expressions "the International Telegraph Convention" and "the International Telegraph Regulations" mean respectively the International Convention of St. Petersburg dated the 10th/22nd July 1875 and the Service Regulations made thereunder and include respectively any modifications of the Convention or Regulations made from time to time.

The expression "the Radiotelegraph Convention 1912" means the Convention signed at London on the 5th day of July 1912 and the Service Regulations made thereunder and includes any modification of the Convention or Regulations made from time to time.

The expression "coast station" means a wireless telegraph station which is established on land or on board a ship permanently moored, and which is open for the service of correspondence between the land and ships at sea.

The term "ship station" means a wireless telegraph station established on board a ship which is not permanently moored.

2. On and after the day of 191 the installation and maintenance of each of the ship stations mentioned in the Schedule hereto by the Licensee shall subject to the provisions of this Licence be deemed compulsory in accordance with the provisions of Regulation 37B of the Defence of the Realm (Consolidation) Regulations 1914.

3. The licensed apparatus shall not be used by the Licensee or by any other person either on behalf or by permission of the Licensee for the despatch or receipt of messages except messages authorised by this Licence.

4. (1) The Licensee shall not by the transmission of any message by means of the licensed apparatus or otherwise by the use of the licensed apparatus interfere with Naval signalling.

(2) If the Admiralty are of opinion that the working of the licensed apparatus at any ship station specified in the Schedule hereto is inconsistent with the free use of Naval signalling the Licensee shall when required in writing by the Postmaster-General so to do close the said station.

(3) These provisions for the protection of Naval signalling shall be construed to be without prejudice to the generality of any other provisions of this Licence.

5. For the purpose of this Licence the Licensee shall observe the International Telegraph Convention and the International Telegraph Regulations so far as the said Convention and Regulations are capable of being applied to wireless telegraphy in common with ordinary land and submarine telegraphy.

6. The Licensee shall observe the provisions of any Regulations from time to time made under the provisions of the Telegraph Acts 1863 to 1916 by the Postmaster-General with the consent of the Treasury in relation to the conduct of wireless telegraph business so far as the same are applicable to the Licensee.

7. The Licensee shall observe the provisions of the Radiotelegraph Convention 1912.

8. The Licensee shall comply with all such directions and observe all such rules as may be given or made by the Postmaster-General from time to time for the purpose of preventing interference with the working of any other wireless telegraph station and for enabling the messages exchanged by means of the licensed apparatus to be distinguished from those emanating from any other wireless telegraph station.

9. The Licensee shall comply in all respects with all such directions and regulations as may from time to time be given or made by the Admiralty.

10. The licensed apparatus shall not without the consent of the Postmaster-General be altered or modified in respect of any of the particulars mentioned in the Schedule hereto.

11. The Licensee shall at all times indemnify the Postmaster-General against all actions claims and demands which may be brought or made by any corporation company or person in respect of any injury arising from any act licensed or permitted by these presents.

12. (1) Subject to the provisions of this Licence the Licensee shall transmit messages by means of the licensed apparatus on equal terms without favour or preference whether as regards rates of charge order of transmission or otherwise. Provided always that signals of distress and messages in connection therewith shall receive priority over all other messages and that the order of transmission of such other messages shall be governed by the International Telegraph Regulations.

(2) In respect of messages transmitted on behalf of His Majesty's Government or the Government of any British Possession or Protectorate the Licensee shall charge rates not in excess of half of the rates charged to the ordinary public.

13. The Licensee shall so far as possible receive from ships and light stations all requests for assistance and all signals of distress and shall answer such requests and signals and send them with the least possible delay to the proper authorities by means of the licensed apparatus or any other means in the power of the Licensee.

14. (1) The licensed apparatus at each of the ship stations mentioned in the Schedule thereto shall be worked only by operators holding certificates issued by the Postmaster-General and the Licensee shall provide for the working of each station at least two such operators.

(2) Certificates will be granted to persons of such technical proficiency and will be in such form and will be subject to such conditions as the Postmaster-General shall from time to time prescribe and they may be endorsed or withdrawn at the discretion of the Postmaster-General in accordance with the conditions to which the Certificates are respectively subject.

15. The Licensee shall not divulge to any person (other than properly authorised officials of His Majesty's Government or a competent legal tribunal) or make any use whatever of any message coming to the knowledge of the Licensee and not intended for receipt by means of the licensed apparatus. The Licensee shall exhibit at each of the ship stations specified in the Schedule hereto a copy of Section 11 of the Post Office (Protection) Act 1884 and any contravention of that section by any person in the employment of the Licensee shall be deemed to be a breach of the provisions of this Licence.

16. The Licensee shall keep full accounts records and registers of all messages transmitted by means of the licensed apparatus and in such registers each of such messages shall be accompanied by its identifying number and date and full particulars of its place of origin and of ultimate destination and such further particulars as the Postmaster-General shall from time to time reasonably require to be shown messages on His Majesty's service being in such registers distinguished from other messages. The Licensee shall preserve all used message forms written and printed and transcripts of messages and all other papers for a period of at least fifteen months counting from the month following that in which the radiotelegrams were handed in as prescribed by the Radiotelegraph Convention 1912 and such registers and message papers shall be open to the inspection of the Postmaster-General or his officers thereto authorised at the registered office of the Licensee for the time being or at such other place as may be agreed between the hours of 10 a.m. and 5 p.m. on every day except Sunday or a statute or general holiday.

17. The Licensee shall render to the Postmaster-General such accounts as the Postmaster-General shall direct in respect of all charges due or payable under the Radiotelegraph Convention 1912 in respect of messages exchanged between the ship stations hereby licensed and coast stations and shall pay to the Postmaster-General at such times and in such manner as the Postmaster-General shall direct all sums which shall be due from the Licensee under such accounts.

18. The Postmaster-General and any agent authorised in that behalf in writing by him may at all reasonable times enter upon all or any of the ship stations hereby licensed for the purpose of inspecting and may inspect any apparatus fixed or being in such stations respectively for the purpose of sending and receiving messages by wireless telegraphy and all other telegraphic instruments and apparatus fixed or being in such stations respectively and the working and user of such apparatus and telegraphic instruments respectively.

19. The Licensee shall carry on every ship on which a ship station is established under this Licence a print or copy of the Licence certified under the hand of an appropriate officer of the Postmaster-General to be a true copy and shall produce such print or copy for inspection if required to do so by the competent authorities of the countries where the ship calls. The Licensee shall also carry on every such ship such documents as may be prescribed by the Postmaster-General for the purpose of enabling the Licensee to communicate with coast stations and ship stations in accordance with the Radiotelegraph Convention 1912.

20. (1) The Licensee shall pay to the Postmaster-General for and in respect of the Licence hereby granted a royalty of five shillings per annum in respect of each ship station at which the licensed apparatus is installed.

(2) The said royalty shall be payable on the 1st of December in each year during which the Licence remains valid.

21. Except with the consent in writing of the Postmaster-General the Licensee shall not assign underlet or otherwise dispose of or admit any other person or body to participate in the benefit of the licences powers or authorities hereby granted or any of such licences powers or authorities.

22. (1) Inasmuch as an emergency has arisen in which it is expedient for the public service that His Majesty's Government shall have control over the transmission of messages by the licensed apparatus it shall be lawful for any Naval Military Customs or Police Officer or any other person authorised by the Admiralty to take possession of the licensed apparatus or any part thereof in the name and on behalf of His Majesty and to use the same for His Majesty's service and any such officer or person so authorised may enter upon any ship on which any such apparatus is installed and take possession of the said apparatus and use the same as aforesaid and subject to such use may use the same or allow it to be used for such ordinary services as may in his discretion seem fit to him or may prohibit and take steps to prevent the use of the same and issue directions which shall be obeyed by the Licensee to prevent such use.

(2) Any such officer or person so authorised as aforesaid may instead of taking possession of the licensed apparatus as aforesaid direct and authorise such persons as he may think fit to assume the control of the transmission of messages by the licensed apparatus either wholly or partly and in such manner as he may direct and such persons may enter upon any ship on which any apparatus is installed accordingly or the said officer or person so authorised as aforesaid may direct the Licensee to submit to him or any person authorised by him all messages tendered for transmission or arriving by the licensed apparatus or any class or classes of such messages to stop or delay the transmission of any messages or deliver the same to him or his agent and generally to obey all such directions with reference to the transmission of messages as the said officer or person so authorised as aforesaid may prescribe and the Licensee shall obey and conform to all such directions.

(3) The Licensee shall be entitled to reasonable compensation for any damage to the licensed apparatus arising in consequence of the exercise of the powers conferred by this clause.

23. Nothing in these presents contained shall prejudice or affect the right of the Postmaster-General from time to time to establish extend maintain and work any system or systems of telegraphic communication (whether of a like nature to that hereby licensed or otherwise) in such manner as he shall in his discretion think fit neither shall anything herein contained prejudice or affect the right of the Postmaster-General from time to time to enter into agreements for or to grant licences relative to the working and user of telegraphs (whether of a like nature to those hereby licensed or otherwise) or the transmission of messages in any part of the United Kingdom by means of wireless telegraphy or by any other means with or to any person or persons whomsoever upon such terms as he shall in his discretion think fit. And (save as in this Licence expressly provided) nothing herein contained shall be deemed to authorise the Licensee to exercise any of the powers or authorities conferred on or acquired by the Postmaster-General by or under the Telegraph Acts or any of them.

24. Any notice request or consent (whether expressed to be in writing or not) to be given by the Postmaster-General under these presents may be under the hand of any one of the Secretaries or

Assistant Secretaries for the time being of the Post Office and may be served by sending the same in a registered letter addressed to the Licensee at the registered office for the time being of the Licensee or if such notice request or consent relates to any particular ship station by delivery to the master of the ship upon which such station is installed and any notice to be given by the Licensee under these presents may be served by sending the same in a registered letter addressed to the Secretary of the Post Office at the General Post Office London.

As Witness my hand and seal this _____ day of _____
One thousand nine hundred and _____

The Schedule of Ship Stations before referred to.

1. Name of Ship on which Station estab- lished.	2. Class of Ship Station under the Ra- diotele- graph Con- vention 1912.	3. Nature of Services performed.	4. Hours of Ser- vice.	Normal Range of Signalling in Nautical Miles.		Character of Apparatus.		9. Qualifi- cation of Operator.	10. Power.		11. Number of Cycles per Second.
				5. By Night.	6. By Day.	7. System of Radio- telegraphy with the Character- istics of the System of Emission.	8. Wave lengths (in Metres).		Source and Maximum Output.	Maximum to be taken by sending Instruments. If Alternator is used, Number of Cycles per Second.	
							600 and 300.	See Clause 14 of the Licence.			

Signed sealed and delivered by

On behalf of the Postmaster-General.

in the presence of

LICENSE TO USE WIRELESS TELEGRAPHY FOR PRIVATE BUSINESS.

Whereas _____ of _____ in the county of _____ (here-
E inafter called "the Licensee") is desirous of establishing
installing working and using a system of wireless telegraphy as
defined in section 1 (7) of the Wireless Telegraphy Act 1904 :

AND WHEREAS by reason of the provisions of the Telegraph Acts
1863 to 19 _____ it is unlawful to establish any wireless telegraph station
or instal or work any apparatus for wireless telegraphy in any place
except under and in accordance with a licence granted in that behalf
by the Postmaster-General and it is also unlawful save as in the said
Acts provided to transmit telegrams within the United Kingdom :

AND WHEREAS at the request of the Licensee I have agreed to
grant to the Licensee the licences powers and authorities hereinafter
expressed and contained for the period upon the terms and subject to
the stipulations and conditions hereinafter appearing :

Now I the above-named _____ His Majesty's Postmaster-General
in exercise of all powers and authorities enabling me in this behalf do
hereby grant to the Licensee during the term or period commencing on
the day of the date hereof and terminating on the 31st day of December
191 _____ license and permission—

(i) to establish and instal work at the stations specified in the
Schedule hereto apparatus for wireless telegraphy (hereinafter

called "the licensed apparatus") provided that the apparatus installed at each station shall be of the character specified in the said Schedule opposite to the name of such station; and

(ii) to transmit and receive messages on the private business of the Licensee by means of the licensed apparatus between the said stations.

AND I do hereby declare that the said license and permission is granted on and subject to the following conditions and provisions:—

1. In these presents (and in the schedule hereto) the following words and expressions shall have the several meanings hereinafter assigned to them unless there be something either in the subject or context repugnant to such construction (that is to say):—

The expression "the Postmaster-General" means the Postmaster-General for the time being.

The expression "wireless telegraphy" has the same meaning as in the Wireless Telegraphy Act 1904.

The term "telegraph" has the same meaning as in the Telegraph Act 1869.

The expression "naval signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy between ships of His Majesty's Navy and Naval Stations or between a ship of His Majesty's Navy or a Naval Station and any other wireless telegraph station whether on shore or on any ship.

The expression "the Admiralty" means the Commissioners for executing the office of Lord High Admiral of the United Kingdom of Great Britain and Ireland.

Apparatus shall be deemed to be "syntonised" when the transmitting apparatus is so adjusted as to communicate with a receiver which has a corresponding adjustment and to produce as little effect as possible on a receiver not having a corresponding adjustment.

2. (1) The licensed apparatus shall not be used by the Licensee or by any person either on behalf or by permission of the Licensee for any purpose except for the transmission and receipt of such messages as aforesaid between and at the stations specified in the Schedule hereto.

(2) No money or other valuable consideration shall be received by the Licensee or by any other person with the authority or by the permission of the Licensee in respect of the transmission or receipt of any messages by means of the licensed apparatus or any part thereof.

3. (1) The Licensee shall not by the transmission of any message by means of the licensed apparatus or otherwise by the use of the licensed apparatus interfere with naval signalling.

(2) Whenever the operators at any signal station of the Licensee perceive through the medium of the instruments used by them that naval signalling is proceeding they shall refrain from using the licensed apparatus until all indication that naval signalling is proceeding shall have ceased.

(3) The Licensee shall if so required in writing by the Admiralty cease to use the licensed apparatus for such period (not exceeding two hours in any one day) as may be specified by the Admiralty.

(4) If the Admiralty are of opinion that the working of the licensed apparatus at any station specified in the Schedule hereto is inconsistent with the free use of naval signalling the Licensee shall when required in writing by the Postmaster-General close the said station.

(5) These provisions for the protection of naval signalling shall be construed to be without prejudice to the generality of any other provisions of this licence.

4. The Licensee shall observe the provisions of any Regulations from time to time made under the provisions of the Telegraph Acts 1863 to 19 by the Postmaster-General with the consent of the Treasury in relation to the conduct of wireless telegraph business.

5. (1) The Licensee shall so work the licensed apparatus as not to interfere with the working of any wireless telegraph station established in the British Islands or the territorial waters abutting on the coasts of the British Islands (whether on shore or on any ship) by or for the purposes of the Postmaster-General or any department of His Majesty's Government or for commercial purposes and in particular with the transmission or receipt of any messages between or at wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

(2) With a view to preventing such interference as aforesaid the Licensee shall comply with all directions which shall be given to the Licensee by the Postmaster-General and with all rules prescribed by the Postmaster-General for observance by his Licensees—

(a) With respect to all arrangements to be adopted for the purpose of securing syntonised apparatus or for enabling the messages exchanged by means of the licensed apparatus to be distinguished from those emanating from any other wireless telegraph station ;

(b) With respect to any alternation of messages which the Postmaster-General may think necessary ; and

(c) Generally with respect to avoiding interference between one wireless telegraph station and another.

6. The licensed apparatus shall not without the consent in writing of the Postmaster-General be altered or modified in respect of any of the particulars mentioned in the Schedule hereto.

7. The Licensee shall at all times indemnify the Postmaster-General against all actions claims and demands which may be brought or made by any corporation company or person in respect of any injury arising from any act licensed or permitted by these presents.

8. The Licensee shall so far as possible receive from ships and light stations all requests for assistance and all signals of distress and retransmit them with the least possible delay to the proper authorities by means of the licensed apparatus or any other means in the power of the Licensee.

9. Subject to the provisions of this licence the Licensee shall not divulge to any person (other than properly authorised officials of His Majesty's Government or a competent legal tribunal) or make any use whatever of any message coming to the knowledge of the Licensee and not intended for receipt by means of the licensed apparatus.

10. The Postmaster-General and any agent authorised in that behalf in writing by him may at all reasonable times enter upon all or any of the stations or other premises in the possession or occupation of the Licensee either solely or jointly with any other person or persons for the purpose of inspecting and may inspect any apparatus fixed or being in such places respectively for the purpose of sending and receiving messages by wireless telegraphy and all other telegraphic instruments and apparatus fixed or being in such places respectively, and the working and user of such apparatus and telegraphic instruments respectively.

11. (1) All apparatus used or intended to be used by the Licensee shall be so erected fixed placed and used as not either directly or by reason of the working or user thereof to interfere with the efficient or convenient maintenance working or user of any telegraphic line of the Postmaster-General which may from time to time exist or which it is probable that the Postmaster-General may have occasion to erect place fix or use or to expose any such line to risk of damage or to risk of interference with the efficient or convenient working or user thereof.

(2) In case any telegraphic line of the Postmaster-General shall be damaged or the efficient working or user thereof shall be wholly or partially interrupted or otherwise interfered with and the Engineer-in-Chief for the time being of the Post Office shall certify in writing under his hand that such damage interruption or interference has been caused directly or indirectly by any apparatus used or intended to be used by the Licensee or by anything done by or on behalf of the Licensee in relation thereto the Licensee shall on demand pay to the Postmaster-General all costs that shall be reasonably incurred by him in repairing such damage and in removing or altering such telegraphic line so as to restore the same to efficient working order and in adding thereto or substituting therefor either temporarily or permanently any other telegraphic line if the said Engineer-in-Chief shall certify that such addition or substitution is reasonably required.

(3) For the purposes of this Article the expression "telegraphic line" has the same meaning as in the Telegraph Act 1878 and the expression "telegraphic line of the Postmaster-General" includes a telegraphic line belonging to or worked by the Postmaster-General or constructed or maintained by him for any Department of the Government or other body or person.

12. (1) The Licensee shall pay to the Postmaster-General on the 1st day of December next for and in respect of the licence hereby granted a royalty of £ per annum in respect of each station.

(2) In the event of the renewal of this licence the said royalty shall be payable on the same day in each succeeding year.

13. Except with the consent in writing of the Postmaster-General the Licensee shall not assign underlet or otherwise dispose of or admit any other person or body to participate in the benefit of the licences powers or authorities hereby granted or any of such licences powers or authorities.

14. If and whenever in the opinion of one of His Majesty's Principal Secretaries of State an emergency shall have arisen in which it is expedient for the public service that His Majesty's Government shall have control over the transmission of messages by the licensed apparatus it shall be lawful for the said Secretary of State by warrant under his hand to direct and cause the licensed apparatus or any part thereof to be taken possession of in the name and on behalf of His Majesty and to be used for His Majesty's service and in that event any person authorised by the said Secretary of State may enter upon the stations offices and works of the Licensee or any of them and take possession thereof and use the same as aforesaid.

15. The Postmaster-General may at any time in his absolute discretion give notice in writing to determine these presents and the licence or permission hereby given at the end of one calendar month from the date of such notice and at the expiration of that period the licence or permission hereby granted shall cease and determine accordingly but without prejudice to any remedy of the Postmaster-General under any condition or provision herein contained.

16. In any of the following cases (that is to say) :—

(a) In case any sum of money which ought to be paid by the Licensee to the Postmaster-General under or by virtue of these presents shall be in arrear and unpaid for one calendar month after the time at which the same ought to be paid under or by virtue of the provisions herein contained ; or

(b) In case of any breach non-observance or non-performance by or on the part of the Licensee of any of the provisions (other than a provision for the payment of money) or conditions herein contained ;

then and in any such case the Postmaster-General may by writing under his seal revoke and determine these presents and the licences powers and authorities hereinbefore granted and each and every of them and thereupon these presents and the said licences powers and authorities and each and every of them shall absolutely cease determine and become void.

Provided always that no such revocation or determination as aforesaid shall prejudice or affect any right of action or remedy which shall have accrued or shall thereafter accrue to the Postmaster-General under any condition or provision herein contained.

17. Nothing in these presents contained shall prejudice or affect the right of the Postmaster-General from time to time to establish extend maintain and work any system or systems of telegraphic communication (whether of a like nature to that hereby licensed or otherwise) in such manner as he shall in his discretion think fit neither shall anything herein contained prejudice or affect the right of the Postmaster-General from time to time to enter into agreements for or to grant licences relative to the working and user of telegraphs (whether of a like nature to those hereby licensed or otherwise) or the transmission of messages in any part of the United Kingdom by means of wireless telegraphy or by any other means with or to any person or persons whomsoever upon such terms as he shall in his discretion think fit and (save as in this licence expressly provided) nothing herein con-

tained shall be deemed to authorise the Licensee to exercise any of the powers or authorities conferred on or acquired by the Postmaster-General by or under the Telegraph Acts or any of them.

18. Any notice request or consent (whether expressed to be in writing or not) to be given by the Postmaster-General under these presents may be under the hand of any one of the Secretaries or Assistant Secretaries for the time being of the Post Office, and may be served by sending the same in a registered letter addressed to the Licensee at the usual or last known place of residence or business of the Licensee, and any notice to be given by the Licensee under these presents may be served by sending the same in a registered letter addressed to the Secretary of the Post Office at the General Post Office, London.

THE SCHEDULE.

1. Name of Station	Normal Range of Signalling.		Character of Apparatus.		6. Power.		7.
	2: By Night.	3, By Day.	4. Description of Receiving Apparatus.	5, Wave Lengths (in Metres).	Source and Maximum Output.	Maximum to be taken by Transmitting Instruments.	If Alternator is used, No. of Cycles per Second.

F In October, 1912, the Board of Trade, at the request of the Lords Commissioners of the Admiralty, issued a notice directing the attention of Masters and Owners of British Merchant Vessels to the necessity for arranging for periodical practices in Wireless Telegraphy communications between H.M. Ships of War and Ships of the British Mercantile Marine for the purpose of ensuring efficient and reliable communication when required.

The co-operation is invited of all British ship-owners and masters whose ships are fitted with wireless telegraphy, in order to give effect to the following proposals :—

(1) At 8.30 a.m. and 2.30 p.m. daily any single man of war (destroyers and small craft excluded) or one man of war in a fleet in company, detailed by the Senior Naval Officer present, will adjust her wireless telegraphy transmitting and receiving apparatus to the commercial 600 metre wave-length and make the call "CCCC," followed by her own commercial call sign, indicating that she is prepared to carry out an exercise with any British merchant ship within range.

On a British merchant ship receiving this call she will answer and say whether or not she is prepared to proceed with the exercise. Should more than one merchant ship answer, the man of war will indicate which is to exercise and which is to wait.

The exercise will then proceed, but no messages are to be exchanged which are not authorised by the respective captains and masters of the ships practising. No message received during

such exercises is to be forwarded beyond the ship actually receiving the message and no payment for any message can be made. The exercises are to be considered as strictly on Service and not for any commercial advantage.

(2) In all such exercises the man of war is to be considered the controlling ship.

(3) The exercises will cease at 9.15 a.m. and 3.15 p.m. respectively, or before, at the discretion of the captains concerned.

(4) These exercises are only to be carried out between vessels, neither of which is within 150 miles range of any commercial shore station using the 600 metre wave-length, and are to cease at once should one of H.M. ships so direct.

MERCHANT SHIPPING (CONVENTION) ACT, 1914.

G An Act to make amendments of the law relating to Merchant Shipping as are necessary or expedient to give effect to an international Convention for the Safety of Life at Sea, signed in London on January the twentieth, nineteen hundred and fourteen, and for purposes incidental thereto.

(10th August 1914)

PART III

(Which deals with Wireless Telegraphy.)

15. (1) Subject to the provisions of this Act, every British ship registered in the United Kingdom which carries 50 or more persons shall be provided with a wireless telegraphy installation, and shall maintain a wireless telegraphy service which shall be at least sufficient to comply with the rules made for the purpose under this Act, and shall be provided with certified operators and watchers at least in accordance with those rules. Provided that the obligations imposed by this section shall not come into operation until such date, not being less than six months after the making of those rules, as may be specified in the rules.

(2) In reckoning the number of persons carried on a ship for the purpose of this section, persons shall not be counted who are exceptionally and temporarily carried on a ship—

(a) As the result of *force majeure* ; or

(b) as the result of the necessity of increasing the number of the crew to fill the places of members of the crew who are ill or disabled ; or,

(c) as the result of the obligation on the part of the master to carry shipwrecked persons, or persons in like circumstances ; or,

(d) if so provided by rules of the Board of Trade, as cargo hands for a part of the voyage not being between one continent and another, and not being, during the time the hands are carried, outside the limits of latitude thirty degrees north and thirty degrees south.

(3) If this section is not complied with in the case of any ship, the master or owner of the ship shall be liable in respect of each offence to a fine not exceeding five hundred pounds, and any such offence may be prosecuted summarily, but if the offence is prosecuted summarily the fine shall not exceed one hundred pounds.

16. (1) The Board of Trade, in consultation with the Postmaster-General, shall make such rules with respect to wireless telegraphy installations and service on British ships which are registered in the United Kingdom and with respect to the carrying on those ships of operators and watchers for the purposes of wireless telegraphy, as appear to them necessary or expedient to carry into effect the provisions of the Convention mentioned in Part V. of the Third Schedule to this Act.

(2) The Board of Trade may by rules made under this section exempt from the obligations of this Act as to wireless telegraphy—

(a) Ships while on voyages the course of which does not take the ship more than a hundred and fifty sea miles from the nearest coast, if the Board are satisfied that the route and the conditions of the voyage are such as to render compliance with those obligations unreasonable or unnecessary; and,

(b) sailing ships on which, owing to the peculiar or primitive nature of their build, it is impossible to provide a proper wireless telegraphy installation.

(3) The Board of Trade may by rules made under this section provide that any automatic calling apparatus which is certified by them to be efficient and to have been accepted by the parties to the Convention may be substituted, for the purposes of the provisions of this Act and any rules made thereunder relating to wireless telegraphy, for a certified operator or watcher.

17. The Board of Trade may postpone the operation of the provisions of this Act relating to wireless telegraphy as respects any particular ship for such period as the Board of Trade determine in each case, if it is shown by the owners of the ship that they have taken all reasonable steps to comply with the provisions of this Act as respects the ships, but that they have been unable to do so owing to difficulties in obtaining delivery of any wireless telegraphy apparatus or of obtaining the service of certificated operators or watchers.

The period of postponement under this section shall not exceed one year in the case of ships which are required in pursuance of the Convention to provide a first-class wireless telegraphy service, and two years in the case of ships which are so required to provide a third-class wireless telegraphy service, and in the case of ships which are so required to provide a second-class wireless telegraphy service, shall not exceed one year as respects the provision of a wireless telegraphy installation and two years as respects the provision of a continuous watch.

(The coming into operation of this Act has been postponed.)

SUPPLEMENT TO THE LONDON GAZETTE OF FRIDAY,
THE 31ST OF JULY, 1914.

Sunday, 2nd August, 1914.

GENERAL POST OFFICE.

H In pursuance of Regulation 5 of the Wireless Telegraphy (Foreign Ships) Regulations, 1908, I, the Right Honourable CHARLES EDWARD HENRY HOBHOUSE, His Majesty's Postmaster-General, do hereby give notice that in the opinion of the Right Honourable REGINALD MCKENNA, one of His Majesty's Principal Secretaries

of State, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, and that the use of wireless telegraphy on board foreign ships whilst in the territorial waters of the British Isles will be subject to such rules as may be made by the Admiralty.

Dated this First day of August, 1914.

EXTRACT FROM *THE LONDON GAZETTE*, 4TH AUGUST, 1914.

Admiralty, S.W., 3rd August, 1914.

With reference to the notification published by the Postmaster-General on the 2nd instant, the following regulations have been made by the Lords Commissioners of the Admiralty prohibiting the use of wireless telegraphy by merchant vessels in the territorial waters of the United Kingdom and Channel Islands :—

1. The use of wireless telegraphy is prohibited in the harbours and territorial waters of the United Kingdom and Channel Islands.

2. On entering any port or harbour or on directions being given to that effect by any naval, military, examination service, Customs or police officer, the aerial wire or antenna is to be at once lowered, disconnected from its halliards, and from the operating room, and is not to be rehoisted while the ship remains in English territorial waters.

3. Any breach of these regulations renders the masters of offending ships liable to penalties and to the confiscation of the wireless apparatus of their ships.

Note.—These regulations do not apply to ships owned (not chartered) by the Admiralty, whether they fly the Blue or the Red Ensign.

By Command of Their Lordships,

W. GRAHAM GREENE.

EXTRACT FROM *THE DEFENCE OF THE REALM (CONSOLIDATION) REGULATIONS*, 1914.

I 22. No person shall, without the written permission of the Postmaster-General, make, buy, sell, or have in his possession, or under his control, any apparatus for the sending or receiving of messages by wireless telegraphy, or any apparatus intended to be used as a component part of such apparatus; and no person shall sell any such apparatus to any person who has not obtained such permission as aforesaid, and any person having in his possession or under his control any such apparatus, whether with or without the permission of the Postmaster-General, shall on demand deliver the apparatus to the Postmaster-General, or as he may direct; and if any person contravenes the provisions of this regulation he shall be guilty of an offence against these regulations.

If the competent naval or military authority has reason to suspect that any person having in his possession any apparatus for sending or receiving messages by telegraphy, wireless telegraphy, telephony, or other electrical or mechanical means is using, or about to use, the same for any purpose prejudicial to the public safety or the defence of the

realm, he may, by order, prohibit that person from having any such apparatus in his possession, and may take such steps as are necessary for enforcing the Order, and if that person subsequently has in his possession any apparatus in contravention of the Order he shall be guilty of an offence against these regulations.

For the purposes of this regulation any apparatus ordinarily used as a distinctive component part of apparatus for the sending or receiving of messages by wireless telegraphy shall be deemed to be intended to be so used unless the contrary is proved.

EXTRACT FROM *THE LONDON GAZETTE*, DATED
28TH JULY, 1916.

J Whereas by an Order in Council dated the twenty-eighth day of November, nineteen hundred and fourteen, His Majesty was pleased to make regulations (called the "Defence of the Realm (Consolidation) Regulations, 1914") under the Defence of the Realm Consolidation Act, 1914, for securing the public safety and the defence of the realm :

And whereas the said Act has been amended by the Defence of the Realm (Amendment) Act, 1915, the Defence of the Realm (Amendment) (No. 2) Act, 1915, and the Munitions of War Act, 1915 :

And whereas the said regulations have been amended by various subsequent Orders in Council :

And whereas it is expedient further to amend the said regulations in manner hereinafter appearing :

Now, therefore, His Majesty is pleased, by and with the advice of His Privy Council, to order, and it is hereby ordered, that the following amendments be made in the said regulations :

N.B.—Paragraphs 1, 2, 3, and 5 of this Statutory Order deal with matters other than Radiotelegraphy, to which Clause 4, which follows, alone refers.

4. After regulation 37A the following regulation shall be inserted :—

" 37B (1) Every British ship of three thousand tons gross tonnage or upwards in respect of which a licence to instal wireless telegraph apparatus has been granted by the Postmaster-General, and which puts to sea from a port in the United Kingdom after a date to be specified in such a licence, shall be provided with a wireless telegraph installation, and shall maintain a wireless telegraph service, and shall be provided with a certified operator, together with suitable accommodation for the apparatus and operator :

" Provided that where a licence has been granted in respect of a ship before the making of this regulation, this obligation shall apply as if the twenty-first day of August, nineteen hundred and sixteen, were the date specified in the licence.

" (2) Application to the Postmaster-General in a form prescribed by him for such a licence shall, unless a licence has before the making of this regulation been granted in respect of the ship, be made—

(a) in the case of a ship of such tonnage as aforesaid registered in the United Kingdom, by the owner thereof on or

before the twenty-first day of August, nineteen hundred and sixteen ; and

(b) in the case of a British ship of such tonnage as aforesaid, registered elsewhere than in the United Kingdom, by the master of the ship within two days from the arrival of the ship in the United Kingdom next after the making of this regulation.

“(3) The Postmaster-General shall, as and when wireless telegraph apparatus and the services of operators become available for the purpose, cause licences to be issued in respect of such ships as in the opinion of the Admiralty should in the national interests be fitted with such apparatus, and the licences shall specify the date as from which the carrying of such apparatus under this regulation is to be compulsory, the character of the apparatus, and the qualifications of the operator.

“(4) The Postmaster-General may—

(a) extend the time mentioned in the licence as the time within which any apparatus is to be provided ; and

(b) exempt any ship from the obligations imposed by this regulation.

“(5) If the provisions of this regulation or the terms of any licence granted thereunder are not complied with in the case of any ship, the master or owner of the ship shall be guilty of a summary offence against these regulations, and if any master or owner fails to make an application in accordance with this regulation he shall be guilty of a summary offence against these regulations, and in either case if the ship is at any time subsequently found at a port of or within the territorial waters adjoining the United Kingdom, the ship may be seized and detained.

“(6) In this regulation expressions have the same meaning as in the Merchant Shipping Acts, 1894 to 1914.”

AMENDMENT OF THE DEFENCE OF THE REALM REGULATIONS.

THE 23RD DAY OF OCTOBER, 1917.

Published in The London Gazette, Friday, 26th October, 1917.

K 6. Regulation 37B shall be amended by the substitution of the following sub-sections for sub-sections (1) (2) and (3) thereof :—

“(1) Every British seagoing ship of sixteen hundred tons gross tonnage or upwards in respect of which a licence to instal wireless telegraph apparatus has been granted by the Postmaster-General shall be provided with a wireless telegraph installation, and shall maintain a wireless telegraph service, and shall be provided with two certified operators, together with suitable accommodation for the apparatus and operators.”

" (2) Application to the Postmaster-General in a form prescribed by him for such a licence shall, unless a licence has before the making of this regulation been granted in respect of the ship, be made as follows :—

(a) As regards every such ship which is registered in the United Kingdom, by the owner on or before the thirteenth day of November, nineteen hundred and seventeen :

(b) As regards every such ship which is registered elsewhere than in the United Kingdom, by the master within two days after the date on which the ship first arrives in the United Kingdom after the twenty-third day of October, nineteen hundred and seventeen."

" (3) The Postmaster-General shall, as and when wireless telegraph apparatus and the services of operators become available for the purpose, cause licences to be issued in respect of such ships as in the opinion of the Admiralty should in the national interests be fitted with such apparatus, and the licences shall specify the date as from which the carrying of such apparatus under this regulation is to be compulsory, the character of the apparatus, and the qualifications of the operators."

GRENADA

(See WEST INDIES (BRITISH), page 546.)

GREECE

ONE of the oldest maritime countries in the world, the kingdom of Greece lies in latitude $30^{\circ} 50'$ to $41^{\circ} 0' N.$; its longitude stretching between $19^{\circ} 20'$ and $26^{\circ} 15'$. The country consists of the southern part of the Balkan Peninsula, and of islands in the Ægean, Mediterranean and Ionian seas. Its official area is estimated at 24,822 square miles.

There are a number of wireless stations in the country of which those given in our Land and Ships Stations sections have been notified.

The political troubles from which Greece has only recently emerged tended to stultify progress ; but the new Government has taken matters vigorously in hand, and has passed a law rendering wireless equipment compulsory for all vessels over 1,000 tons in the service of the Greek Government. The text of this law will be found below :—

We are, at the time of going to press, unable to print any *General Enactment* under which wireless telegraphy is administered in the Greek kingdom ; but we subjoin :—

A—Royal Decree dated September 20th, 1917, Relative to the Installation of Wireless on Merchant Ships.

B—Law passed September 20th, 1917, dealing with the appointment and qualifications of radiotelegraphists.

ROYAL DECREE.

A ART. I.—Greek Government vessels of 300 tons dead weight and over, as well as vessels of 1,000 tons and upwards, must be equipped with Wireless telegraph apparatus, possessing a range of 100 miles, and furnished with emergency apparatus with a

radius of not less than 30 miles. These installations must fulfil the technical conditions laid down for the service of wireless telegraphy on board vessels of war.

ART. 2.—Starting with January 1st, 1918, any vessel falling under the categories above referred to in Art. 1, which are not fitted with wireless telegraphy, shall be forbidden to clear from Greek ports; and owners violating this clause shall be summarily punished by the Port Authority, without any right of appeal, or shall be mulct of a fine amounting to 5,000 francs (an amount which shall be liquidated in accordance with the law governing Procedure against Creditors of the State), and the delinquents shall at the same time be sentenced to three months imprisonment.

By Royal Decree and by administrative action on the part of the Minister for the Navy, the operation of the above clauses may be postponed.

ART. 3.—On passenger vessels of a smaller tonnage than 300 tons, the State may instal for the period of the war wireless telegraph apparatus which is the property of the State. In this case the ship-owners shall only be liable for the expense of suitably preparing and arranging the vessels for the installation and working of the radiotelegraphic apparatus. In such cases, moreover, the Government is at liberty at any time to remove such equipment without becoming liable to any indemnity in favour of the shipowners.

ART. 4.—For the duration of the present war the personnel required for the working of ship stations shall form part of the Royal Navy in accordance with articles 1 and 3 of the current law. Shipowners are bound to provide suitable rationing and quarters for the radiotelegraphists on similar lines to those provided in the Royal Navy of Greece, as well as rationing and quarters for men in the Royal Naval Service who may be located on board their vessels in pursuance of the orders of the Minister of the Navy, whether they be employed for working the installations or for other service with regard to men or equipment. Such rationing and quarters shall be provided in accordance with the rank of the persons affected.

The regular pay and allowances for all men belonging to the Royal Navy mentioned in the above paragraph shall be liquidated by the State. This pay and allowances shall be handed to them at the end of each month on behalf of the Minister for the Navy, and in accordance with his instructions, by the captains of the vessels at whatever place they may happen to be at the time.

The clauses above enumerated come into force on September 1st, 1917.

ART. 5.—In the event of shipowners finding it impossible to provide the necessary apparatus for the vessels which form the subject of the above Article 1, the Government shall procure such apparatus and shall instal the station. In such cases the shipowners shall be obliged to recoup the Government for their expenditure on the apparatus and shall repay the cost of installation to the State Exchequer.

In case of any refusal on the part of shipowners to liquidate the expense incurred, this payment shall be enforced by the application of the clauses relative thereto in the laws governing the procedure against creditors of the State.

ART. 6.—The present law shall take effect from the date of its publication in the *Government Gazette* dated at Athens September 20th, 1917.

LAW

FOR REGULATING THE STATUS AND CLASSIFICATION OF RADIO-TELEGRAPHISTS DURING THE PRESENT WAR.

B ART. 1.—The rank of Quartermaster Telegraphists may be granted for the duration of the present war, in accordance with the Royal Decree of January 31st, 1912, entitled "For the Institution of a Wireless Telegraph Service, etc." (modified by the subsequent Decree of April 26th, 1912, and the Royal Decree of May 17th, 1912), to a number in excess of that which had been originally fixed, and to an extent in accordance with the needs of the service. Candidates for this rank must possess the qualifications laid down in Article 11 of the Royal Decree of January 31st, 1912 (modified by the Royal Decree of April 26th, 1912). They must have attained the age of 17 years and not exceed the age of 25 years.

For those who have passed the age of 20 years it is indispensable that they should have served their time with the Military Forces of the Crown, or that they should be in course of so serving.

To the above-mentioned rank there are also admitted persons who are not Greek subjects, provided that such persons have declared, or do declare, themselves desirous of obtaining Greek nationality, and under the proviso that they are in possession of the necessary qualifications, as well as within the age mentioned in the second paragraph of this article.

ART. 2.—The direct conferring of the rank of Quartermaster Telegraphist to men in excess of the number fixed by statute referred to above may only be effected in the case of young men in possession of a radiotelegraphic diploma for mercantile vessels, or who hold a certificate from a private radiotelegraphic school. Before being admitted they must pass the examination obligatory for students at the Special Preparatory Wireless School of the Greek Navy.

Such individuals must have attained the age of not less than 17 years, and not more than 25 years, and must not have been subject to the penalties laid down by Articles 21 and 22 of the Penal Code.

In the event of their being over 20 years, they must have performed their term of Military Service, or be in course of so doing.

ART. 3.—All such individuals as are above referred to must be classed as of Temporary Rank, in accordance with Articles 1 and 2. They must remain in the service of the Royal Navy for the whole duration of the present war, and for any period in excess thereof which may be fixed by the Minister for the Navy in accordance with the requirements of the service. They are also subject to dismissal from the service on the initiative of the Minister for the Navy (after consultation with their superior officers) either on the grounds of bad conduct or incapacity.

Their service in the Royal Navy shall reckon as part of their term of Compulsory Military Service, except in the event of dismissal for bad conduct or incapacity, or on account of their failure to pass the qualifying examinations.

Non-Commissioned Telegraphist Officers may, on the recommendation of their superiors (if approved by the Minister for the Navy), receive a fixed appointment for five years to vacant positions of full telegraphists.

ART. 4.—Authority is hereby given for the appointment of a special instructor, either a Greek or foreign subject, to give tuition in the Preparatory School for Wireless Telegraphy for the duration of the war, at a salary amounting to 200 drachmas per month. After the closing of the school this instructor may be retained in the service of the State at the same salary during the duration of the present war in the capacity of inspector of Wireless Installations on Merchant Ships.

ART. 5.—A further Royal Decree shall define the uniform to be worn by students and others, in accordance with the provisions of the present law.

ART. 6.—This law shall come into force immediately on its publication in the *Government Gazette*, dated at Athens, September 20th, 1917.

GUATEMALA

THE Republic of Guatemala lies south-eastward of Mexico, and is almost shut off from the Atlantic Ocean by British Honduras on the north and by the Republic of Honduras on the south-east. Puerto Barrios and Livingston constitute the chief ports of the Republic on the Atlantic seaboard (San José, the chief port), Champerico and Ocos on the Pacific.

The Republic in its present form was established on March 21st 1847, after having formed part, for 26 years, of the Confederation of Central America. The Constitution dated from December 1879, modified in 1885, 1887, 1889, and 1903. At the present moment radiotelegraphy is represented by a pair of American stations at Guatemala City and Puerto Barrios respectively.

This installation is nominally under the supervision of the Minister of Public Works, but is entirely under the personal direction of the President. An American operator named Mr. J. H. Watts, of the U.S. Navy, has been lent to the Government for the purpose of superintending the working.

No laws and regulations have up to the present been issued in Guatemala to regulate the use of wireless.

HAITI

THE Republic of Haiti occupies the western (French speaking) portion of the island of San Domingo,* which ranks only second in size to Cuba, amongst the West Indian Islands. Its area is estimated at 10,200 square miles.

The Republic does not itself possess any wireless stations, and has passed no regulations affecting wireless telegraphy. The various stations which do exist in the island all constitute items in the American occupation, and remain under the supervision of U.S.A. officials.

HOLLAND

(See NETHERLANDS, page 381.)

* For Wireless Organisation and Laws current in the Dominican Republic see under Santo Domingo:

HONDURAS (BRITISH)

(See BRITISH HONDURAS, page 216.)

HONG KONG

(See CHINA, FOREIGN SETTLEMENTS, page 244.)

HUNGARY

THE Kingdom of Hungary dates from the occupation of the country by the Magyars in the ninth century A.D. Constitutionally speaking the method of government is that of an aristocratic monarchy. According to the *Ausgleich* (in the Magyar tongue *Kiegyezés*), the compromise under which its relations with Austria were settled on December 21st, 1867, the two states are perfectly independent, being only united through the identity of the Sovereign.

This independence is evidenced in the fact of the two countries Austria and Hungary possessing separate Wireless Laws and Regulations.

In view of the fact that Hungary, in union with Austria and Germany, is at present in a state of war against Great Britain and her Allies, it is not possible to do more than print here the laws current at the outbreak of hostilities in accordance with the following list :—

ORDER

ISSUED BY THE ROYAL HUNGARIAN PRESIDENT OF THE BOARD OF TRADE IN 1912 IN RESPECT OF WIRELESS TELEGRAPHIC EQUIPMENTS ON HUNGARIAN OCEAN-GOING PASSENGER SHIPS.

* * * * *

In accordance with Sections 24 and 27 of the appendix to my Order No. 60,805, dated August 21st, 1912, concerning measures of safety for and equipment of sea-going merchant ships before they are allowed to be on active service : all passenger vessels which are already in active service, liners running to time-table from Hungarian ports further than Gibraltar or Aden carrying passengers, at latest by February 1st, 1915, and all new ships before they go into active service must be fitted with such radio-telegraphic apparatus as is able to give and receive messages under normal conditions at a distance of 100 nautical miles at least.

That this Order may be carried out, I issue the following instructions :—

1. The shipowner must apply for the permission of the Royal Hungarian President of the Board of Trade to provide a wireless station on board. The application must be accompanied by a technical description of the apparatus and four drawings. The previous permission of the Royal Hungarian President of the Board of Trade must be applied for and received in case of any change of system or of any other alteration which affects the ability of the apparatus to receive and send messages.

2. The equipment of the station must be such that it shall conform to section 3 of the London Radio-Telegraphic Convention, and it must be able to work in conjunction with other radio-telegraphic stations of

a different system—*i.e.*, it shall be able to send and receive messages from them and it must be abreast of the latest developments of technical progress. The previous approval of the Royal Hungarian President of the Board of Trade is necessary for the choice of the system to be applied.

The apparatus must be such that it shall be possible to tune to 300 metres as well as 600 metres wave-length and with these it shall be possible to send and receive at least 20 words per minute, counting the words at 5 letters each. The station, in accordance with the London International Radio-Telegraph Service Rules XXXV. s. 2 (*a-d*), may also use a wave-length of 1,800 metres.

3. The necessary machines and materials for the equipment of the station, if possible, must be acquired in Hungary. Such materials and machines brought from foreign countries can only be used by special permission of the Royal Hungarian President of the Board of Trade. The auxiliary books and similar official equipment will be supplied at cost price by the General Manager of the Royal Hungarian Post and Telegraph Offices.

4. All vessels which have a permanent Radio-Telegraphic Station, also those which have limited service in accordance with the London Radio-Telegraph Service Rules s. XI. must have an auxiliary radio-telegraphic equipment fitted in the manner determined by the Royal Hungarian President of the Board of Trade.

This auxiliary equipment must be provided with its own special power supply, which must be absolutely independent of all the other (not radiotelegraphic) power supply equipments of the ship and it must be such that it shall be possible to put it into active service quickly; it shall work for at least six hours and it must be suitable for a range of 80 nautical miles in case of a station in permanent service and 50 nautical miles in case of a station with a limited service.

This special auxiliary equipment can be dispensed with on ships where the regular radiotelegraphic equipment satisfies all requirements.

5. The speed of transmission and reception will be fixed by the Royal Hungarian President of the Board of Trade in the licence to be issued.

In case of new inventions which promote the reliability and speed of sending and receiving messages to a considerable degree, the Royal Hungarian President of the Board of Trade may compel the ship-owner after due and fair consideration of all practical conditions and of cost to apply the new invention on the station within a fixed period.

6. The electric power used at the radio-telegraphic apparatus must not exceed one kilowatt under normal conditions, and greater power can only be applied in case communications have to be exchanged at a longer distance than 200 nautical miles from the nearest shore station or when by reason of obstacles this greater increase of power is necessary.

7. The station may be examined and its working controlled by the employees of the General Manager of the Royal Hungarian Post and Telegraph Offices at any time. The shipowner must grant facilities

to individuals proposed by the General Manager of the Royal Hungarian Post and Telegraph Offices as well as to the members of the Imperial and Royal Navy through the intermediary of the General Manager of the Royal Hungarian Post or Telegraph Offices to become acquainted with the working of the station, this extending to all particulars, and that they shall acquire the necessary experience.

The shipowner may not agree to any such conditions which the supplier of the equipment might make as that the equipment or any part of it must be kept secret as regards the deputies of the General Manager of the Royal Hungarian Post and Telegraph Offices and of the Imperial and Royal Navy who cannot be excluded.

The shipowner is obliged to carry without charge in classes according to their rank (including the use of sleeping cabins) persons sent for controlling and studying and must provide them with food at his own charge. For each voyage, however, only two such individuals can be sent.

8. The Royal Hungarian President of the Board of Trade will determine in the licence the character of the service of the deck station (public, special destination, etc.) and duration (continuous, limited service), the number of operators to be employed and also their qualification in Classes I. and II.

9. The Royal Hungarian President of the Board of Trade reserves the right to suspend at any time the use of the deck-station for an indefinite period or for ever, or in respect of certain specified communications, without giving any reason or indemnity.

In case of mobilisation ordered in the Monarchy of Austria-Hungary or of war, if the commander of the vessel does not receive from the General Manager of the Royal Hungarian Post and Telegraph Offices instructions to the contrary, the station must be put absolutely out of use.

The commander of the ship is responsible for carrying out this rule.

In all other respects the shipowner must comply with the special instructions received in case of mobilisation or war.

10. The radio-telegraph operators must be Hungarian citizens with an unimpeachable record, who are able to speak or write the Hungarian language perfectly and who have received a diploma from the examining commission sent out by the Royal Hungarian President of the Board of Trade that they thoroughly understand how to handle the radiotelegraphic apparatus.

Persons who receive this diploma must take before the examining commission an oath of fidelity to observe their duties and obligations to the service, and among these latter they must swear to keep all telegrams secret, which the written certificate will testify.

The employees of the station are subject to the ship's discipline ; they must have a " ship service " book and must be included in the list of the crew (or staff).

The shipowner may train for the radio-telegraphic service only such persons whose training has been sanctioned by the General Manager of Post and Telegraph Offices.

Any radio-telegraphic employee whose diploma is cancelled by the General Manager of the Royal Hungarian Post and Telegraph Offices must be dismissed at once.

The shipowner must report to the General Manager of the Royal Hungarian Post and Telegraph Offices and to the Royal Hungarian Naval Authority immediately every change which occurs in the staff of the radiotelegraphic service.

11. On payment of the regular fees anyone may use such stations for telegraphing as are equipped for public service.

The station fee to be charged must be submitted by the Company to the Royal Hungarian President of the Board of Trade and fixed by him.

The shipowner is entitled to this station fee.

12. The shipowner is responsible for the telegraphic fees which are due to the Home and Foreign Telegraph Offices from the proceeds of the ship station telegrams. The shipowner—*i.e.*, the deck station—may communicate with foreign Telegraph Authorities and also with the Berne International Telegraph Association Bureau about matters concerning administration only through the General Manager of the Royal Hungarian Post and Telegraph Offices.

13. The station must enter into communication for exchange of radiotelegram with all shore and ship stations without regard to the system they use and they must also accept distress signals coming from anywhere and answer them and make the necessary arrangements.

The ship station must have special consideration for the shore station. The ship station must be kept continually in good condition with a view of exact and proper communication with shore stations.

If it is the wish of the shore station, the ship station shall interrupt its communications at once.

14. With regard to the working of the ship station and the accounting for the fees: the London Radio-Telegraph Agreement and the Service Rules connected therewith, the St. Petersburg Telegraph Agreement and the Service Rules connected with it, as well as the orders of the General Manager of the Royal Hungarian Post and Telegraph Offices whether already issued or still future must be followed.

The ship station—*i.e.*, its owner—must comply with the legislative decisions and regulations concerning telegraph offices, telephones, and electric signals.

In foreign waters they must comply not only with the International Radio-Telegraph Agreement and Service Rules, but also with the special rules (if any) in that particular country. It is the duty of the shipowner to acquaint himself with these.

15. As an acknowledgment of the right reserved to the State the shipowner must pay at the date mentioned in the licensing document and in cash 20 kronen annually per station and a controlling fee of 30 kronen.

In case an investigation should become necessary in consequence of the negligence or fault of the shipowner or his employee, and the investigation should find the shipowner or his employee guilty, the shipowner shall refund to the Treasury the entire cost of the investigation.



MARCONI VACUUM GAUGE.

[To face page 324.

16. As a penalty for negligence or mistakes committed in connection with the Radiotelegraph service—in case it is neither transgression nor criminal—the General Manager of the Royal Hungarian Post and Telegraph Offices can fine the shipowner any sum up to K. 100.

17. If the ship station does not fulfil its obligations, though repeatedly warned, or if the use of the station is directed against public interest, the Royal Hungarian President of the Board of Trade has the right to apply a penalty of K. 100 up to K. 1,000, or give instructions that a deputy sent out by him shall manage the station service at the expense and risk of the shipping company, and the necessary alterations shall be made at the expense of the shipowner, in order to put a stop to the deficiencies in the deck station equipment, or else he may suspend or withdraw the licence for the telegraph outfit.

18. The licence for the equipment and upkeep of the Radiotelegraph station cannot extend to a longer period than twenty years. After expiry of the period fixed in the licence the equipment, together with the whole appurtenances (furniture, articles of equipment), and together with the auxiliary equipment (if any) shall pass into the ownership of the Royal Hungarian Post in good and serviceable condition, without any charge and free from all liability thereon.

If the Royal Hungarian Post does not desire to take over the station, which thus passes into its ownership, but cedes it for further use to the shipowner, the shipowner must pay 20 kronen, together with and additional to the fees mentioned in section 16, as an acknowledgment of the fact that the ownership of the equipment has been acquired by the State.

Regarding vessels which are withdrawn from service, the licensing document concerning the ship station becomes void, and the shipowner must report this to the General Manager of the Royal Hungarian Post and Telegraph Offices. The transferring of the Radiotelegraph equipment to another vessel necessitates a new licence.

19. The Royal Hungarian President of the Board of Trade has the right to take over into State management temporarily or permanently any ship station whenever he chooses without giving a reason, before the licence expires, or to dismantle it.

In case it is temporarily taken over the owner must hand over for use free, and without claim for indemnity, the radiotelegraph apparatus, all necessary articles of outfit for the upkeep and the supplies, as well as the official room and the operators' cabins; he must supply the necessary power for telegraphing, and to the operators services in kind all free of charge (board, medical treatment, service, etc.). On the other hand, the ship fees are due to the shipowner.

The conditions of the definite taking possession will be laid down by an order to be issued and also by the licensing document.

The definite occupation must take place under normal conditions after six months' notice, but the Royal Hungarian President of the Board of Trade reserves the right in the public interest to reduce this period or take over the station at any time without giving notice.

20. In the public interest, as to which the Royal Hungarian President of the Board of Trade shall be the sole judge, the General Manager of the Royal Hungarian Post and Telegraph Offices—with the exclusion of every claim for indemnity which can be realised by legal means—can take measures for fitting out any kind of vessel with radio-telegraph at the expense of the Treasury, for the upkeep of the same, and, when the public interest does not demand it any more, for the dismantling of the same; and also to make regulations for refunding a certain indemnity to the owner of the vessel which arises out of this.

21. The Royal Hungarian President of the Board of Trade reserves the right to make exceptions in certain cases under above rules according to practical requirements.

INDIA

GREAT BRITAIN'S connection with India followed on that of the Portuguese, Dutch, and French in the fifteenth, sixteenth, and seventeenth centuries respectively. The London East India Company, formed to concentrate in a single corporation the isolated British trading efforts in the Far East, was incorporated under Royal Charter by Queen Elizabeth on December 31st, 1600.

The famous Indian mutiny of 1857 brought a realisation of the fact that a commercial company is not suited for administering an Empire, and in 1858 Queen Victoria assumed "the Government of the territories in India." In 1877 the British Queen adopted the title of "Empress of India," and at present the name "British India" covers all territories governed by the King-Emperor through the Governor-General of India, or through any officer subordinate to him; whilst "India" means "British India," together with any territories of any native prince or chief under the suzerainty of His Majesty, exercised through the Governor-General of India or any officer subordinate to him (Act 52 & 53 Vict., C. 63, S. 18).

Continental India (including Baluchistan) stretches between $8^{\circ} 0'$ and $37^{\circ} 0'$ N. latitude, and lies from $61^{\circ} 0'$ to $101^{\circ} 0'$ E. longitude. Delhi, the new capital, lies in $77^{\circ} 0'$ E. longitude. The total area covers 1,803,000 square miles, with a population of over 315,000,000; in other words, it includes a territory larger than the continent of Europe, exclusive of Russia.

The CONTROL OF RADIOTELEGRAPHY in India is vested in the Director-General of Posts and Telegraphs, assisted by the chief engineer of the telegraphs department, except as regards small portable sets belonging to the wireless signal squadrons of the Army. All the radio stations in India are erected and worked by the Telegraph Department.

Immediately subordinate to the above-mentioned high officials are the Directors of Telegraph Engineering of the Northern, Eastern, and Southern Circles, as well as the Postmaster-General and the Director of Telegraph Engineering in Burma. There are, in addition, superintendents of telegraph engineering in charge of the telegraph divisions where wireless stations are situated. There are now twenty wireless telegraph stations in India, of which nine are open to general

public correspondence. These are :—Calcutta, Madras, Bombay, Karachi, Sand-Heads, Rangoon, Victoria Point, Diamond Island, and Port Blair.

There are no *privately owned* stations, nor are there any *Wireless Clubs* or Societies.

The following list shows the chief officers controlling wireless telegraphy :—

	Name.	Headquarters.
Director-General of Posts and Telegraphs	The Hon. Sir Wm. Maxwell, K.C.I.E., M.V.O., I.C.S.	Simla
Chief Engineer, Telegraphs	R. Meredith, Esq., C.I.E....	Simla.
Director, Telegraph Engineering Northern Circle	J. M. Coode, Esq.	Lahore.
Director, Telegraph Engineering, Southern Circle	W. S. Sharpe, Esq.	Bombay.
Director, Telegraph Engineering, Eastern Circle	G. P. Roy, Esq., M.I.E.E....	Calcutta.
Postmaster-General and Director, Telegraph Engineering, Burma	G. W. Talbot, Esq.	Rangoon.
Superintendent, Wireless Telegraphs, attached to the office of the Director-General	J. N. Parker, Esq....	Calcutta.

The above list does not include the afore-mentioned superintendents of telegraph engineering in charge of divisions where wireless stations are situated.

The first stations opened for traffic in India were three 2-kw. Lodge-Muirhead stations at Diamond Island, Table Island, and Port Blair, erected for the maintenance of communication with the Andaman Islands. These date from March, 1905.

The ADMINISTRATION OF RADIOTELEGRAPHY in India is governed by the Indian Telegraph Act, XIII., of 1885, as modified up to June 1st, 1910. This is further extended by (1) the Indian Telegraph (Amendment) Act, VII., of 1914, by (2) the Indian Post Office and Telegraph (Amendment) Act, XIV., of 1914, and by (3) the Indian Wireless Telegraph (Ships) Rules, 1915. Of the Basic Act we give an abstract below, whilst we print in full (1), (2), and (3).

We also append rules relating to the granting of experimental licences to military officers.

At present it is only possible to add, to the above, the notation that, during the continuance of the present war, no licences to work wireless telegraphy are issued, and no experiments are permitted by private individuals.

The following list of Laws and Regulations affecting radiotelegraphy in India are printed in our pages :—

A—Abstract of the Indian Telegraph Act, No. XIII., of 1885, as modified up to June 1st, 1910.

B—The Indian Telegraph (Amendment) Act, No. VII., of 1914.

C—The Indian Post Office and Telegraph (Amendment) Act, No. XIV., of 1914.

D—The Indian Wireless Telegraph (Ships) Rules 1915.

E—First Schedule.

F—Second Schedule.

G—Regulations Governing Experimental Licences.

TELEGRAPH ACT XIII. OF 1885.

(Modified up to June 1st, 1910.)

A Part I. deals with former Acts which are hereby repealed, and with definitions of terms used in the present Act.

Part II. reads as follows :—

PART II.

PRIVILEGES AND POWERS OF THE GOVERNMENT.

4. Within British India, the Governor-General in Council shall have the exclusive privilege of establishing, maintaining and working telegraphs :

Provided that the Governor-General in Council may grant a licence, on such conditions * and in consideration of such payments as he thinks fit, to any person to establish, maintain or work a telegraph within any part of British India.

5. (1) On the occurrence of any public emergency, or in the interest of the public safety, the Governor-General in Council or a Local Government, or any officer specially authorised in this behalf by the Governor-General in Council, may—

(a) take temporary possession of any telegraph established, maintained or worked by any person licensed under this Act ; or

(b) order that any message or class of messages to or from any person or class of persons or relating to any particular subject, brought for transmission by, or transmitted or received by, any telegraph, shall not be transmitted, or shall be intercepted or detained, or shall be disclosed to the Government or an officer thereof mentioned in the order.

(2) If any doubt arises as to the existence of a public emergency, or whether any act done under sub-section (1) was in the interest of the public safety, a certificate signed by a Secretary to the Government of India or to the Local Government shall be conclusive proof on the point.

6. Any railway company, on being required so to do by the Governor-General in Council, shall permit the Government to establish and maintain a telegraph upon any part of the land of the company, and shall give every reasonable facility for working the same.

7. (1) The Governor-General in Council may, from time to time, by notification in the *Gazette* of India, make rules consistent with this Act for the conduct of all or any telegraphs established, maintained or worked by the Government or by persons licensed under this Act.

(2) Rules under this section may provide for all or any of the following, among other matters, that is to say :—

(a) the rates at which, and the other conditions and restrictions subject to which, messages shall be transmitted ;

(b) the precautions to be taken for preventing the improper interception or disclosure of messages ;

* For rules as to grant of telephone exchanges and telegram subscription rules in connection with such exchanges, see Genl. Stat. R. & O., Vol. II., pp. 972 and 983.

(c) the period for which, and the conditions subject to which, telegrams and other documents belonging to, or being in the custody of, telegraph officers shall be preserved ; and

(d) the fees to be charged for searching for telegrams or other documents in the custody of any telegraph officer.

(3) When making rules for the conduct of any telegraph established, maintained or worked by any person licensed under this Act, the Governor-General in Council may, by the rules, prescribe fines for any breach of the same :

Provided that the fines so prescribed shall not exceed the following limits, namely :—

(i) when the person licensed under this Act is punishable for the breach, one thousand rupees, and in the case of a continuing breach a further fine of two hundred rupees for every day after the first during the whole or any part of which the breach continues ;

(ii) when a servant of the person so licensed, or any other person, is punishable for the breach, one-fourth of the amounts specified in clause (i).

8. The Governor-General in Council may, at any time, revoke any licence granted under section 4, on the breach of any of the conditions therein contained, or in default of payment of any consideration payable thereunder.

9. The Secretary of State for India in Council shall not be responsible for any loss or damage which may occur in consequence of any telegraph officer failing in his duty with respect to the receipt, transmission or delivery of any message ; and no such officer shall be responsible for any such loss or damage unless he causes the same negligently, maliciously or fraudulently.

Part III. deals with power to place telegraph lines and posts, and covers sections 10–18, finishing with *Paragraph 19*.

19. Every telegraph line or post placed before the passing of this Act under, over, along, across, in or upon any property, for the purposes of a telegraph established or maintained by the Government, shall be deemed to have been placed in exercise of the powers conferred by, and after observance of all the requirements of, this Act.

Part IV. deals with penalties under the Act, and contains Paragraphs 20, 21, 22, 23, and 24 ; passing on to *Paragraph 25*.

25. If any person, intending—

(a) to prevent or obstruct the transmission or delivery of any message, or

(b) to intercept or to acquaint himself with the contents of any message, or

(c) to commit mischief,

damages, removes, tampers with or touches any battery, machinery, telegraph line, post or other thing whatever, being part of or used in or about any telegraph or in the working thereof, he shall be punished with imprisonment for a term which may extend to three years, or with fine, or with both,

Paragraphs 26, 27, 28, and 29 deal with offences connected with conversion of official secrecy and misconduct on the part of officials. This Part IV. concludes with *Paragraphs 30-32.*

30. If any person fraudulently retains, or wilfully secretes, makes away with or detains a message which ought to have been delivered to some other person, or, being required by a telegraph officer to deliver up any such message, neglects or refuses to do so, he shall be punished with imprisonment for a term which may extend to two years or with fine, or with both.

31. A telegraph officer shall be deemed a public servant within the meaning of sections 161, 162, 163, 164, and 165 of the Indian Penal Code; * and in the definition of "legal remuneration" contained in the said section 161, the word "Government" shall, for the purposes of this Act, be deemed to include a person licensed under this Act.

32. Whoever attempts to commit any offence punishable under this Act shall be punished with the punishment herein provided for the offence.

Part V. contains supplemental provisions covering charges for damage made against Local Governments, and contains Paragraphs 33 and 34 of the Act.

ACT No. VII. OF 1914.

PASSED BY THE GOVERNOR-GENERAL OF INDIA IN COUNCIL.

(Received the assent of the Governor-General on the 28th February, 1914.)

An Act further to amend the Indian Telegraph Act, 1885.

B Whereas it is expedient further to amend the Indian Telegraph Act, 1885; It is hereby enacted as follows:—

1. This Act may be called the Indian Telegraph (Amendment) Act, 1914.

2. For sub-section (2) of section 1 of the Indian Telegraph Act, 1885 (hereinafter called the said Act), the following shall be substituted, namely:—

"(2) It extends to the whole of British India, including the Sonthal Parganas and the Pargana of Spiti, and it applies also to—

(a) all native Indian subjects of His Majesty in any place without and beyond British India;

(b) all other British subjects within the territories of any Native State in India; and

(c) all servants of the King, whether British subjects or not, within the territories of any Native State in India."

3. In clause (1) of section 3 of the said Act for the words "transmitting or making," the words "making, transmitting or receiving" shall be substituted.

4. Section 4 of the said Act shall be renumbered section 4 (1) and after the said sub-section the following proviso and sub-section shall be added, namely:—

"Provided further that the Governor-General in Council may, by rules made under this Act and published in the *Gazette of India*,

permit, subject to such restrictions and conditions as he thinks fit, the establishment, maintenance and working—

(a) of wireless telegraphs on ships within Indian territorial waters, and

(b) of telegraphs other than wireless telegraphs within any part of British India.

“(2) The Governor-General in Council may, by notification in the *Gazette* of India, delegate to the telegraph authority all or any of his powers under the first proviso to sub-section (1).

“The exercise by the telegraph authority of any power so delegated shall be subject to such restrictions and conditions as the Governor-General in Council may, by the notification, think fit to impose.”

5. After section 19 of the said Act the following sections shall be inserted, namely :—

“19A. (1) Any person desiring to deal in the legal exercise of a right with any property in such a manner as is likely to cause damage to a telegraph line or post which has been duly placed in accordance with the provisions of this Act, or to interrupt or interfere with telegraphic communication, shall give not less than one month's notice in writing of the intended exercise of such right to the telegraph authority, or to any telegraph officer whom the telegraph authority may empower in this behalf.

“(2) If any such person without having complied with the provisions of sub-section (1) deals with any property in such a manner as is likely to cause damage to any telegraph line or post, or to interrupt or interfere with telegraphic communication, a Magistrate of the first or second class may, on the application of the telegraph authority, order such person to abstain from dealing with such property in such manner for a period not exceeding one month from the date of his order and forthwith to take such action with regard to such property as may be in the opinion of the Magistrate necessary to remedy or prevent such damage, interruption or interference during such period.

“(3) A person dealing with any property in the manner referred to in sub-section (1) with the *bona fide* intention of averting imminent danger of personal injury to himself or any other human being shall be deemed to have complied with the provisions of the said sub-section if he gives such notice of the intended exercise of the right as is in the circumstances possible, or where no such previous notice can be given without incurring the imminent danger referred to above, if he forthwith gives notice of the actual exercise of such right to the authority or officer specified in the said sub-section.

“19B. The Governor-General in Council may, by notification in the *Gazette* of India, confer upon any licensee under section 4, in respect of the extent of his licence and subject to any conditions and restrictions which the Governor-General in Council may think fit to impose and to the provisions of this Part, all or any of the powers which the telegraph authority possesses under this Part with regard to a telegraph established or maintained by the Government or to be so established or maintained :

“Provided that the notice prescribed in section 19A shall always be given to the telegraph authority or officer empowered to receive notice under section 19A (1).”

6. For section 20 of the said Act the following section shall be substituted, namely :—

“ 20. (1) If any person establishes, maintains or works a telegraph within British India in contravention of the provisions of section 4 or otherwise than as permitted by rules made under that section, he shall be punished, if the telegraph is a wireless telegraph, with imprisonment which may extend to three years, or with fine, or with both, and, in any other case, with a fine which may extend to one thousand rupees.

“ (2) Notwithstanding anything contained in the Code of Criminal Procedure, 1898, offences under this section in respect of a wireless telegraph shall, for the purposes of the said Code, be bailable and non-cognizable.

“ (3) When any person is convicted of an offence punishable under this section, the Court before which he is convicted may direct that the telegraph in respect of which the offence has been committed, or any part of such telegraph, be forfeited to His Majesty.”

7. After section 20 of the said Act the following section shall be inserted, namely :—

“ 20A. If the holder of a licence granted under section 4 contravenes any condition contained in his licence, he shall be punished with fine which may extend to one thousand rupees, and with a further fine which may extend to five hundred rupees for every week during which the breach of the condition continues.”

8. After section 25 of the said Act the following section shall be inserted, namely :—

“ 25A. If, in any case not provided for by section 25, any person deals with any property and thereby wilfully or negligently damages any telegraph line or post duly placed on such property in accordance with the provisions of this Act, he shall be liable to pay the telegraph authority such expenses (if any) as may be incurred in making good such damage, and shall also, if the telegraphic communication is by reason of the damage so caused interrupted, be punishable with a fine which may extend to one thousand rupees :

“ Provided that the provisions of this section shall not apply where such damage or interruption is caused by a person dealing with any property in the legal exercise of a right if he has complied with the provisions of section 19A (1).”

9. After section 29 of the said Act the following section shall be inserted, namely :—

“ 29A. If any person, without due authority,—

(a) makes or issues any document of a nature reasonably calculated to cause it to be believed that the document has been issued by, or under the authority of, the Director-General of Telegraphs, or

(b) makes on any document any mark in imitation of, or similar to, or purporting to be, any stamp or mark of any Telegraph Office under the Director-General of Telegraphs, or a mark of a nature reasonably calculated to cause it to be believed that the document so marked has been issued by, or under the authority of, the Director-General of Telegraphs, he shall be punished with fine which may extend to fifty rupees.”

10. In section 34 (1) of the said Act after the figures and word " 18, sub-section (1)," the words, figures and letter " and section 19A, sub-section (2)," shall be inserted.

ACT No. XIV. OF 1914.

PASSED BY THE GOVERNOR-GENERAL OF INDIA IN COUNCIL.

(Received the assent of the Governor-General on the 16th September, 1914.)

C An Act further to amend the Indian Telegraph Act, 1885, and the Indian Post Office Act, 1898.

Whereas in view of the amalgamation of the offices of Director-General of Telegraphs and of Director-General of the Post Office of India, it is expedient further to amend the Indian Telegraph Act, 1885, and the Indian Post Office Act, 1898 :

It is hereby enacted as follows :—

1. This Act may be called the Indian Post Office and Telegraph (Amendment) Act, 1914.

2. In clause (6) of section 3 and in section 29A of the Indian Telegraph Act, 1885, for the word "Telegraphs," wherever it occurs the words "Posts and Telegraphs" shall be substituted.

3. In section 2 of the Indian Post Office Act, 1898,—

(i) in clause (a), for the words "the Post Office of India" the words "Posts and Telegraphs" shall be substituted; and

(ii) in clause (k), after the word "department," the words "established for the purpose of carrying the provisions of this Act into effect and" shall be inserted.

INDIAN WIRELESS TELEGRAPH (SHIPS) RULES, 1915, DATED
DELHI, FEBRUARY 24TH, 1917.

D In exercise of the powers conferred by section 4 of the Indian Telegraph Act, 1885 (XIII of 1885), as amended by the Indian Telegraph (Amendment) Act, 1914 (VII of 1914), the Governor-General in Council is pleased to make the following rules regulating the establishment, maintenance and working of wireless telegraphs on ships within Indian territorial waters :—

1. These rules may be called the Indian Wireless Telegraph (Ships) Rules, 1915.

2. In these rules, unless there is anything repugnant in the subject or context—

"Convention" means the International Radiotelegraph Convention concluded at London on July 5th, 1912.

"Director-General" means the Director General of Posts and Telegraphs, India.

"Harbour" includes harbours whether natural or artificial, estuaries, navigable rivers, piers, jetties and other works in or at which ships can obtain shelter, or ship and unship goods or passengers.

"Licence" means a licence granted under these rules.

"Service Regulations" means the service regulations annexed to the Convention.

3. Except by general or special permission in writing from the Director-General or an officer authorised by him in this behalf, no person shall work or use a wireless telegraph on board any ship (other than a ship of war) whilst the ship is in any harbour in India.

4. No person shall send any message by means of the wireless telegraph on board any ship (other than a ship of war), whilst the ship is within Indian territorial waters, when and where such message can be forwarded by a Government telegraph either with or without wires.

5. When communications are made by means of wireless telegraph between any ship within Indian territorial waters and a wireless telegraph station on land, the rules in force for the working of wireless telegraph at that station, as given in the Handbook, General Rules, and Departmental Instructions for Radiotelegraph stations, shall be observed.

6. No person shall work the wireless telegraph on board any ship within Indian territorial waters in such a way as to interrupt or interfere with—

(a) Naval or military signalling ; or

(b) the transmission of messages between other wireless telegraph stations.

Explanation.—In this rule Naval or Military signalling includes signalling or communicating, by means of any system of wireless telegraphy, by His Majesty's Imperial, Colonial, or Indian Naval or Military Forces.

7. The Director-General or any officer authorised by him in this behalf may demand to be shown the licence or copy of such licence issued to any ship authorising the use of any wireless telegraph on board the ship or the certificate issued to the operator on the ship, and every person having the licence or certificate in his possession or under his control shall comply with such demand.

8. No wireless telegraph shall be established or worked on any ship registered in British India except under licence granted by the Director-General on behalf of the Governor-General in Council in the form in the First Schedule to these rules and subject to the terms and conditions set forth in that form.

9. The Director-General shall not grant a licence unless he is satisfied that—

(a) the wireless telegraph can be worked in accordance with the provisions of the Convention and the Service Regulations, and

(b) operators qualified in accordance with Rule 12 will be employed to work the same.

10. A licence may include any number of ships belonging to the same person.

11. (1) The Director-General may grant to the holder of a licence a supplementary licence in respect of any ship belonging to him and not included in the original licence.

(2) A supplementary licence shall be in such form as the Director-General thinks fit, and shall be deemed to be incorporated with the original licence, and the original licence shall apply to each ship included in the supplementary licence to the same extent as if the ship had been included in the original licence.

12. No person shall work a wireless telegraph on board any ship registered in British India unless he is of British nationality and holds either a first or a second-class certificate of competency granted by, or under the authority of, the Director-General or a certificate (issued by the authority empowered to grant such certificates) entitling the holder to be employed as a wireless telegraph operator on board ships registered in the United Kingdom or in a British Possession or Protectorate.

13. (1) The Director-General may grant certificates of competency in accordance with the conditions contained in the Second Schedule to these rules.

(2) Should the holder of a certificate of competency granted under these rules be proved to the satisfaction of the Director-General wilfully or negligently to have failed to comply with the provisions of the Convention or the Service Regulations, or any other regulations which may be issued from time to time for his guidance, the Director-General may endorse, suspend or cancel the certificate.

(3) The Director-General or any officer authorised by him in this behalf may require the holder of a certificate of competency to produce the same for endorsement under sub-rule (2), and the holder shall comply with such requisition.

14. Nothing in these rules shall apply to the use of a wireless telegraph for the purpose of making or answering signals of distress.

THE FIRST SCHEDULE.

(See Rule 8.)

LICENCE TO ESTABLISH WIRELESS TELEGRAPH SHIP STATIONS.

E In these presents (and in the Table annexed hereto) the following words and expressions shall have the several meanings hereinafter assigned to them unless there be something either in the subject or context repugnant to such construction (that is to say) :—

The expression “the Director-General of Posts and Telegraphs” means the Director-General of Posts and Telegraphs, India, for the time being.

The expression “the Telegraph Act” means the Indian Telegraph Act, 1885 (XIII of 1885).

The word “telegraph” has the same meaning as in the Telegraph Act.

The expression “the Rules” means the Rules made from time to time under the Telegraph Act.

The expression “Naval signalling” means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty’s Navy between ships of His Majesty’s Navy and Naval Stations or between a ship of His Majesty’s Navy or a Naval station and any other wireless telegraph station whether a coast station or a ship station.

The expressions “the International Telegraph Convention” and “the International Telegraph Regulations” mean respectively the International Convention of St. Petersburg dated the 10th—

22nd July, 1875, and the Service Regulations made thereunder and include respectively any modification of the said Convention or Regulations made from time to time.

The expression "the Radiotelegraph Convention, 1912" means the International Radiotelegraph Convention signed at London on the 5th day of July, 1912, and the Service Regulations made thereunder and includes any modification of the Convention or Regulations made from time to time.

The expression "coast station" means a wireless telegraph station which is established on land or on board a ship permanently moored, and which is open for the service of correspondence between the land and ships at sea.

The expression "ship station" means a wireless telegraph station established on board a ship which is not permanently moored.

Apparatus shall be deemed to be "syntonised" when the transmitting apparatus is so adjusted as to communicate with a receiver which has a corresponding adjustment, and to produce as little effect as possible on a receiver not having a corresponding adjustment.

WHEREAS of hereinafter called "the Licensee" is desirous of establishing, maintaining and working on the ships belonging to the Licensee, specified in the Table annexed hereto, wireless telegraphy under section 4 of the Indian Telegraph Act, 1885 (XIII of 1885):

AND WHEREAS by reason of the provisions of the said Telegraph Act it is unlawful to establish, maintain or work any apparatus for wireless telegraphy on board any ship registered in British India except under and in accordance with rules made in that behalf by the Governor-General of India in Council:

AND WHEREAS the Licensee has requested the Governor-General in Council to grant to the Licensee the licenses, powers and authorities hereinafter expressed and contained for the period, upon the terms and subject to the stipulations and conditions hereinafter appearing:

Now the Governor-General in Council in exercise of all powers and authorities enabling him in this behalf hereby grants to the Licensee during the term or period commencing on the day of the date hereof, and terminating on the 31st day of December 191, licence and permission—

(i) To establish, maintain and work for the purposes hereinafter mentioned at the ship stations specified in the Table annexed hereto and at such other ship stations as may be specified in any Supplemental Licence given from time to time under the hand of the Director-General of Posts and Telegraphs, but subject in all respects to the Rules, apparatus for wireless telegraphy of the kind used in the system known as the system of wireless telegraphy.

Provided that—

(a) the apparatus installed at each ship station shall be of the character specified in the said Table opposite to the name of such station or in any such Supplemental Licence as aforesaid;

(b) the apparatus used at all of the said ship stations shall be syntonised ;

(c) the licensed apparatus shall be so constructed as to be capable of using wave-lengths of 300 and 600 metres in length as measured by the standard of measurement in use for the time being by the Government of India and such other wave-lengths not exceeding 600 metres in length as shall be authorised in writing from time to time by the Director-General of Posts and Telegraphs ;

Provided that only wave-lengths of 600 metres shall be used by the Licensee during the period of any war in which the United Kingdom is engaged ;

(d) the apparatus shall admit of the transmission and reception of messages at the rate of not less than 20 words a minute, five letters being counted as one word ;

(ii) to transmit and receive messages by means of the licensed apparatus between the said ship stations and between the said ship stations and coast stations and other ship stations. Provided that the transmission and receipt of messages from and at the said ship stations when in any harbour in India shall be subject to such conditions and restrictions as the Governor-General in Council may prescribe from time to time ; and

(iii) to receive money or other valuable consideration for or in respect of the use of the licensed apparatus or for or in respect of the transmission or receipt of messages by means of the said apparatus :

And it is hereby declared that the said license and permission is granted on and subject to the following further conditions and provisions :—

1. The licensed apparatus shall not be used by the Licensee or by any other person either on behalf or by permission of the Licensee for the transmission or receipt of messages except messages authorised by this Licence.

2. (1) The Licensee shall not by the transmission of any message by means of the licensed apparatus or otherwise by the use of the licensed apparatus interfere with Naval signalling.

(2) If the Governor-General in Council is of opinion that the working of the licensed apparatus at any ship station specified in the Table annexed hereto or in any such Supplemental Licence as aforesaid is inconsistent with the free use of Naval signalling the Licensee shall, when required in writing by the Director-General of Posts and Telegraphs so to do, close the said station ; the making of such a requisition shall be conclusive evidence of the opinion of the Governor-General in Council to the effect aforesaid.

(3) These provisions for the protection of the Naval Signalling shall be construed to be without prejudice to the generality of any other provisions of this Licence.

3. For the purposes of this Licence the Licensee shall observe the International Telegraph Convention and the International Telegraph Regulations so far as the said Convention and Regulations are capable of being applied to wireless telegraphy in common with ordinary land and submarine telegraphy.

4. The Licensee shall observe the provisions of the radiotelegraph Convention, 1912.

5. The Licensee shall comply with all such directions and observe all such rules and regulations as may be given or made by the Director-General of Posts and Telegraphs from time to time for the purpose of preventing interference with the working of any other wireless telegraph station and for enabling the messages exchanged by means of the licensed apparatus to be distinguished from those emanating from any other wireless telegraph station.

6. The licensed apparatus shall not, without the consent of the Director-General of Posts and Telegraphs, be altered or modified in respect of any of the particulars mentioned in the Table annexed hereto or in any such Supplemental Licence as aforesaid.

7. The Licensee shall at all times indemnify the Governor-General in Council against all actions, claims and demands which may be brought or made by any corporation, company or person in respect of any injury arising from any act licensed or permitted by these presents.

8. (1) Subject to the provisions of this Licence and of the Rules the Licensee shall transmit messages by means of the licensed apparatus on equal terms without favour or precedence whether as regards rates of charge order of transmission or otherwise.

(2) In respect of the messages transmitted on behalf of His Majesty's Government the Licensee shall charge rates not in excess of half of the rates charged to the ordinary public.

9. The Licensee shall so far as possible receive from ships and light stations all requests for assistance and all signals of distress and shall answer such requests and signals and retransmit them with the least possible delay to the proper authorities by means of the licensed apparatus or any other means in the power of the Licensee.

10. The licensed apparatus at the said ship stations shall be worked only by a person or persons holding a certificate or certificates of competency issued by the Director-General of Posts and Telegraphs or by the proper authority in the United Kingdom, or in any British Possession or Protectorate.

11. The Licensee shall not divulge to any person (other than properly authorised officials of the Government of India or a competent legal tribunal) or make any use whatever of any message coming to the knowledge of the Licensee and transmitted by Naval signalling or by any system of wireless telegraphy provided or maintained by or for the purposes of the different Departments of the Government of India, or by any other Licensee of the Government of India.

12. (1) The Licensee shall keep full accounts, records and registers of all messages transmitted by means of the licensed apparatus and in such registers each of such messages shall be accompanied by its identifying number and date and full particulars of its place of origin and of ultimate destination and such further particulars as the Director-General of Posts and Telegraphs shall from time to time reasonably require to be shown, messages on the service of the Government of India being in such registers distinguished from other messages.

(2) The Licensee shall preserve all used message forms written and printed and transcripts of messages and all other papers for a period of at least 15 months counting from the month following that in which the radio-telegrams were handed in as prescribed by the Radio-telegraph Convention, 1912, and in default of any provisions on the subject in the said Convention for such period as is from time to time prescribed by the International Telegraph Regulations and such registers and message papers shall be open to the inspection of the Director-General of Posts and Telegraphs or his officers thereto authorised at the Office of the Licensee in between the hours of 10 a.m. and 5 p.m., on every day except Sunday or a statute or general holiday.

13. The Licensee shall render to the Director-General of Posts and Telegraphs such accounts as the Director-General shall from time to time direct in respect of all charges due or payable under the Radio-telegraph Convention, 1912, in respect of messages exchanged between the ship stations hereby licensed and coast stations and shall pay to the Director-General at such times and in such manner as he shall direct all sums which shall be due from the Licensee in accordance with such accounts.

14. The Director-General of Posts and Telegraphs and any agent authorised in that behalf in writing by him may at all reasonable times enter upon all or any of the ship stations mentioned in the said Table for the purpose of inspecting and may inspect any apparatus fixed or being in such stations respectively for the purpose of sending and receiving messages by wireless telegraphy and all other telegraphic instruments and apparatus fixed or being in such stations respectively and the method of working and user of such apparatus and telegraphic instruments, respectively.

15. The Licensee shall carry on every ship mentioned in the said Table on which a ship station is established a print or copy of the Licence and supplemental licence if any certified under the hand of an officer authorised for that purpose by the Director-General of Posts and Telegraphs to be a true copy and also such documents as may be prescribed by the Director-General of Posts and Telegraphs for the purpose of enabling the Licensee to communicate with coast stations in accordance with the Radio-telegraph Convention, 1912.

16. Except with the consent in writing of the Governor-General in Council the Licensees shall not assign, underlet or otherwise dispose of, or admit any other person or body to participate in the benefit of the Licences, powers and authorities hereby granted or any of such Licences, powers or authorities.

17. (1) If and whenever an emergency shall have arisen in which it is expedient for the public service that the Governor-General in Council shall have control over the transmission of messages by the licensed apparatus it shall be lawful for the Director-General or any other officer specially authorised by him to cause the licensed apparatus or any part thereof to be taken possession of in the name and on behalf of the Governor-General in Council and to be used for the service of the Government and subject thereto for such ordinary services as to the said officer may seem fit and in that event any person authorised by

the said officer may enter upon any ship on which any such apparatus is installed and take possession of the said apparatus and use the same as aforesaid.

(2) Any such officer may in such event as aforesaid instead of taking possession of the licensed apparatus as aforesaid direct and authorise such persons as he may think fit to assume the control of the transmission of messages by the licensed apparatus either wholly or partly and in such manner as he may direct and such persons may accordingly enter upon any ship on which any such apparatus is installed and assume such control or the said officer may direct the Licensee to submit to him or any person authorised by him all messages tendered for transmission or arriving by the licensed apparatus or any class or classes of such messages, to stop or delay the transmission of any messages, or deliver the same to him or his agent and generally to obey all such directions with reference to the transmission of messages as the said officer may prescribe and the Licensee shall obey and conform to all such directions.

(3) The Licensee shall be entitled to reasonable compensation for any damage to the licensed apparatus arising in consequence of the exercise of the powers conferred by this clause.

18. The Governor-General in Council may at any time by notice in writing but without assigning any reason revoke and determine these presents and the licences, powers and authorities hereinbefore granted and each and every of them as to all or any of the ship stations hereby licensed and thereupon these presents and the said licences, powers and authorities and each and every of them shall absolutely cease, determine and become void as to all or any of the said ship stations (as the case may be) but without prejudice to any right of action or remedy which shall have accrued or shall thereafter accrue to the Government of India under any condition or provision herein contained.

19. Nothing in these presents contained shall prejudice or affect the right of the Governor-General in Council, from time to time, to establish, extend, maintain and work any system or systems of telegraphic communication (whether of a like nature to that hereby licensed or otherwise) in such manner as he shall in his discretion think fit; neither shall anything herein contained prejudice or affect the right of the Governor-General in Council from time to time and at any time to enter into agreements for or to grant licences relative to the working and user of telegraphs (whether of a like nature to those hereby licensed or otherwise) or the transmission of messages in any part of British India or Indian Waters by means of wireless telegraphy or by any other means with or to any person or persons whomsoever upon such terms as he shall in his discretion think fit. And (save as in this Licence expressly provided) nothing herein contained shall be deemed to authorise the Licensee to exercise any of the powers or authorities conferred on or acquired by the Governor-General in Council by or under the Telegraph Act.

20. Any notice, request or consent (whether required to be in writing or not) to be given by or on behalf of the Governor-General in

Council under these presents may be under the hand of the Director-General of Posts and Telegraphs and may be served by sending the same in a registered letter addressed to the Licensee at the office for the time being of the Licensee, or if such notice, request or consent relates to any particular ship station, by delivery to the master of the ship upon which such station is installed ; and any notice to be given by the Licensee under these presents may be served by sending the same in a registered letter addressed to the Director-General of Posts and Telegraphs.

Signed, sealed and delivered by
Director-General of Posts and Tele-
graphs for and in the name and as
the act and deed of the Governor-
General in Council in the presence of

TABLE OF LICENSED SHIP STATIONS.

Name of Ship on which Station Established	Normal Range of Signalling in Nautical Miles.		Character of Apparatus.		Power			If Alternator is used Number of Cycles per Second.
	By Night.	By Day.	Description of Receiving Apparatus.	Wave Lengths in Metres.	Source and Maximum Output.	Maximum taken by Transmitting Instruments.		
						Current.	Voltage.	
1.	2.	3.	4.	5.	6.	7.	8.	9.

Other particulars :—

THE SECOND SCHEDULE.

(See Rule 13.)

F CONDITIONS FOR THE GRANTING OF CERTIFICATES OF COMPETENCY AS WIRELESS TELEGRAPH OPERATOR ON BOARD SHIPS, REGISTERED IN BRITISH INDIA.

1. Certificates of competency as wireless telegraph operator on board ships registered in British India shall be granted by the Director-General subject to an examination, shall be issued in Form B annexed hereto, shall indicate the system or systems of radiotelegraphy in which the holder's examination was conducted, and shall certify that the holder—

(a) in the case of first-class certificates, is able to send and receive, by sound, messages in plain language in the International Morse Code at a rate of not less than 20 words per minute (five letters being counted as one word) ; or

(b) in the case of second-class certificates, is able to send and receive, by sound, messages in plain language in the International Morse Code at a rate of from 12 to 19 words per minute (five letters being counted as one word); and

(c) is able to adjust the apparatus ordinarily used in some well-known system of wireless telegraphy so as to suit the varying conditions of working, without using excessive transmitting power; and

(d) has an efficient working knowledge of the regulations applicable to the exchange of radiotelegraphic traffic.

2. (1) Candidates at an examination will be expected—

(a) to send on an ordinary Morse Key for five consecutive minutes at not less than the prescribed speed. The accuracy of signalling, the correct formation of the letters, and the correctness of spacing shall be taken into account;

(b) to receive and write legibly at the prescribed speed from a double headgear telephone receiver as ordinarily used for radiotelegraphic reception;

(c) to understand simple diagrams of the electrical connections of the apparatus used in the system in which he is being examined;

(d) to be able to connect up the apparatus with the help of such diagrams so far as this is required in the system in which he is being examined;

(e) to name the principal parts of the apparatus and indicate their use;

(f) to mention the most common faults, and the means usually taken to remedy them in the system in which he is being examined;

(g) to explain the steps taken to change from one wave-length to another, in sending and receiving, in the system in which he is being examined.

(2) The practical examination shall embrace the following:—

(a) Connecting up the apparatus.

(b) Operating (sending and receiving).

(c) Regulating and adjusting.

(d) Altering the wave-length.

(e) Reducing or increasing the transmitting power.

(f) Tracing and clearing faults.

(3) The examination in regard to the actual transmission of messages shall be based upon the rules contained in the handbook published by the Director-General.

3. Candidates for examination shall fill up an application in Form A annexed hereto and submit the same to the Director-General at Calcutta. The date and place of examination shall be notified to the candidate as soon as possible after receipt of the application.

If the candidate be successful in his examination he will sign the photograph in the presence of the Examining Officer. The Examining Officer will at the same time take the age, place and date of birth and the description of the candidate from the latter's application in Form A.

The photograph will be affixed to the back of the certificate in the office of the Director-General of Posts and Telegraphs and stamped with a special date stamp overlapping photograph and certificate.

The particulars of the description of the candidate as also his age, and date and place of birth will be entered on the back of the certificate.

^{Salut} The certificate will then be sent to the operator by post.

The photograph and description will be checked by the Port Authorities when the operator is signing on a ship. If the operator has not already signed his name in the space provided for that purpose on the front of the certificate he will do so in the presence of the Port authorities.

4. Candidates for examination shall pay an examination fee of Rs. 5 by means of postage stamps affixed to the form of application.

5. Examinations of persons desirous of obtaining certificates of competency referred to in Condition 1 shall ordinarily be conducted at Calcutta. Special arrangements may be made, where circumstances permit, for holding an examination at any wireless station at which suitable apparatus is provided for the purpose.

6. If the candidate satisfactorily passes the examination, he shall make a declaration that he will observe the secrecy of radiotelegrams which come to his knowledge in the course of duty.

7. In case of failure at an examination a candidate shall not ordinarily be re-examined until after the lapse of three months. An additional fee of Rs. 5 shall be payable in respect of the further examination.

REGULATIONS GOVERNING EXPERIMENTAL LICENCES.

G The Government of India have decided that the granting of licences to military officers in respect of wireless telegraph apparatus used for experimental purposes shall be regulated by the following general principles :—

(1) When an officer conducts experiments in wireless telegraphy in his official capacity at the expense of the Government no licence is required, but only executive permission, which may be given so far as the Telegraph Department is concerned by the Director-General, Posts and Telegraphs.

(2) When an officer carries on experiments as a private individual at his own expense he must obtain a licence. If the approval of the military authorities is required to what he proposes to do, he should obtain such approval before the Director-General, Posts and Telegraphs is approached. The licence will then be submitted by the Director-General, Posts and Telegraphs, for the sanction of the Government of India.

(3) With reference to the above, attention is drawn to the necessity for applying for licences to own and use wireless telegraphy apparatus or installations, experimental or otherwise. Applications for such licences will be submitted through the Chief of the General Staff and will contain particulars regarding the apparatus, showing (a) system it is proposed to employ, (b) maximum range of signalling with applicants' own receiving apparatus, (c) power (current and voltage), (d) source of power.

ITALY

THE historic kingdom of Italy comprises the centre of the three great peninsulas of Southern Europe, and extends from $46^{\circ} 40' 12''$ to $34^{\circ} 54' 54''$ north latitude; its longitude stretching from $18^{\circ} 30' 37''$ to $6^{\circ} 33' 7''$ east. The seaboard of the peninsula covers 2,272 miles. The total area amounts to 110,632 square miles.

The present constitution of Italy is an expansion of the "Statuto Fondamentale del Regno," granted March 4th, 1848, by King Charles Albert to his Sardinian subjects. The executive power of the State belongs exclusively to the Sovereign, working through responsible Ministers; whilst the legislative authority rests conjointly with the King and Parliament, the latter consisting of two Chambers. King Vittorio Emanuele III., born November 11th, 1869, is a direct descendant of the Vittorio Emanuele who was declared King of Italy on March 17th, 1861, by the first Italian Parliament.

The association of Italy with wireless telegraphy has from the start been very close, and the land of his birth has in many different ways recognised what she owes to her distinguished son, Senatore Marconi.

Wireless telegraph land stations in the kingdom belong to the Government and are operated by the Ministry of the Navy (Department of Artillery and Armaments), the Ministry of Posts and Telegraphs and the Ministry of War.

Each Ministry includes a special department for dealing with wireless telegraphy.

The current Rules and Regulations which we print below may be summarised in the following List:—

A—Law of June 30th, 1910, No. 395.

B—Regulations (No. 227) of April, 1912.

C—Law of June 30th, 1912.

D—Decree No. 1587, dated November 12th, 1916.

A The following is known as the Law of June 30th, 1910, No. 395:—

ART. 1.—The establishment and exploitation of the radiotelegraphic and radiotelephonic installations are reserved to the Government, and in general of all those for which, in the State and in the Colonies, on land and on board ship, energy is employed in order to obtain distance effects without the use of conducting wires.

The Government has the right to grant to any person, public or private scientific or training institution, the authority to establish and to exploit installations of such a nature on land and on the passenger and mercantile vessels, for which previous concession must be obtained.

The licence may be revoked upon the recommendation of the consulting Commission when the installations cause interruption of State stations which were in operation prior to the concession, or when they do not comply with the technical conditions established in the licence.

The exploitation of the installations granted can be revoked, suspended, or taken over by the Government in time of war or during peace whenever the Government may deem it necessary and opportune.

The Government has also the right to inspect, through its officials, those stations which are not the property of the State, in order to ascertain whether the stations are operated in accordance with the regulations.

ART. 2.—The Government administrations concerned in these services are the Ministry of Posts and Telegraphs, of War and the Admiralty ; and special regulations determine the share of the respective departments in the execution of the present law.

A permanent consultive commission is constituted to give opinions upon international agreements, questions of a scientific nature, and upon doubtful points relating to the said services.

The commission shall also decide every doubtful case which may arise of a technical character regarding the installation and exploitation of the concessions according to Art. 1.

The commission shall be qualified to determine the power of the radiotelegraphic and radiotelephonic apparatus and technical and economic details for their use on vessels engaged in emigration traffic, when the said apparatus has been installed by the Government according to Art. 11 of the Royal Decree, March 14th, 1909, No. 130.

Questions concerning indemnity on account of the cancellation of a licence, suspension of exploitation, or redemption as per Art. 1, shall be referred to an arbitration tribunal, which shall decide, without right of appeal. This tribunal shall be composed of three members, one nominated by the Government, one by the licensee, the third by the President of the Tribunal in Rome. The Government can leave to the said Commission the selection of its own arbitrator.

Where several licensees are interested parties to a dispute, and they are unable by mutual agreement to nominate an arbitrator, each shall submit the name of an arbitrator, and the choice will be made by drawing lots in the presence of a judge of the Tribunal of Rome.

The composition of the Commission in the present article and the rules of its working have been determined in the regulations.

ART. 3.—Every infringement of Art. 1 of the present law is punishable by a fine up to £It.2,000, and with imprisonment up to one year, which penalties may be imposed separately and together according to the circumstances. It is in the power of the judge to add to the said penalties the confiscation of the apparatus.

During criminal proceedings the Administration can, in virtue of decree by the prefect, and at all times that in the opinion of the prefect would be in the public interest, obtain immediate possession of the installation and provide if necessary for its removal.

Any person will incur the same penalties if he should avail himself of the installation on board commercial or passenger vessels when they are at anchor in the State waters, except in case of danger or other special cases, which will be dealt with in the regulations.

ART. 4.—If any person shall cause damage or deterioration to installations, or in any other manner interrupt, or cause interruption of the service, even temporarily, he will be liable to the penalties laid down in Art. 315 of the Penal Code, except in the case of military interference with military stations, for which offence the penalties stated in the military Penal Code will be imposed.

If any person should abuse the use of the distress signal of the vessels in danger, he will be subject to the same penalties.

ART. 5.—The penalties established by the present law are understood to be applicable, without prejudice to greater offences which may take down in Art. 315 of the Penal Code, except in the case of military Penal Code.

B The following regulations (No. 227) were published in April, 1912, for carrying out the Act of June 30th, 1910 (No. 395):—

SECTION 1.

1. The Ministry of Posts and Telegraphs shall have under its control :—

(a) The installation and exploitation of the stations for public service and constituting the interior net-work of the State and of all those opened for international communication.

(b) The verifications, inspection and control of the material and working of the service of all the land installations exploited in virtue of Government licence.

(c) The tariff regulation for communication between all land stations and ship and shore stations, also accounting.

The Ministry of War shall have under his control :—

The installation and working of stations destined exclusively to the military service, including movable field stations for use in the R. Army. In time of war the management of the service (either a part or all the stations destined to the public service) can be taken over by the military administration.

The Admiralty shall have under its control :—

The installation and exploitation of the ship stations of the Royal Navy, private and mercantile ; the verifications, inspections and control of the materials and of the working of the service of the installations made for passenger and mercantile traffic.

SECTION 2.

2. *Permanent Consulting Radiotelegraphic Commission.*—The Permanent Consulting Commission is composed of a President not belonging to the Government Administration, two members selected amongst persons of well-known ability in electric and radiotelegraphic science, a superior officer of the Royal Navy attached to the General Staff, and a superior officer attached to the office of the Chief of the General Staff of the Royal Navy.

The following are members of the Commission by right :—

(1) The Director of Posts and Telegraphs Higher Institution.

(2) The Director in Chief of the Radiotelegraphic Department of the Posts and Telegraphs.

(3) The Officer-Director of the Radiotelegraphic Department in the Army Office of Rome.

(4) The Superior Officer of the General Staff of the Royal Navy, Chief of the Department of the Submarines, Electric Material and Radiotelegraphic Service at the Admiralty.

Three members, selected amongst the three mentioned Administrations, will act as Secretaries.

3. The President, members and secretaries will be nominated by Royal Decree, proposed, by common accord, by the Ministers of the Posts and Telegraphs, Admiralty, and War.

By Ministerial decree extraordinary members, without vote, can be added temporarily, these to be selected from persons of well-known skill, proposed by the President of the Commission.

4. The Commission shall have its office at the Admiralty in Rome. The meetings of the Commission are to be convened by the President at the request of the interested Administrations.

5. The opinion of the Consulting Commission can be asked on the following subjects :—

(a) On the compilations of arrangements and special rules for the technical organisation of the radiotelegraphic and radiotelephonic service of the State, as well as for practical rules for the constitution and exploitation of the installations.

(b) On all questions of a scientific nature, and doubtful cases referring to the radiotelegraphic and radiotelephonic services.

(c) On International Conventions.

(d) On technical conditions with reference to licences of radiotelegraphic and radiotelephonic stations.

(e) The establishment, before granting the licence, of indemnity due in case the installation should be repealed, suspended, or taken over by the State according to paragraph III., Art. 1 of the law.

(f) Repeal of the licences.

(g) On the adoption of new radiotelegraphic and radiotelephonic systems, and on the application of same by the Government service, unless they should deal with interesting systems concerning the defence of the State.

The qualified Administrations may whenever they think it warranted ask the opinion of the Commission on any subject.

The Commission is entitled to avail itself for its own study of the working rooms and of the Government experimental stations, but a previous application must be lodged with the Administrations.

6. The expenses for the working of the Commission are to be divided amongst the three Administrations interested.

SECTION 3.

7. *Licences for the Exploitation of Radiotelegraphy and Radiotelephony.*—Licences to persons, to institutions, and to public and private Administrations for the installation of any radiotelegraphic or radiotelephonic station will be granted in virtue of an agreement containing the conditions to be observed, by a decree issued by the Ministry of the Posts and Telegraphs, acting in harmony with the Ministry of War and the Admiralty.

Such licences cannot last longer than February 16th, 1917. After this period the licence can be renewed.

8. Licences for radiotelegraphic stations for private use are limited to private correspondence between properties of the same licensee or between properties of two licensees, all correspondence with third persons being absolutely excluded. Such licences are exempted from tax when the stations are constructed on private property and work over all the territory dividing the stations, without interruption by public land.

Licensees are also exempted from taxes which are granted for installation of radiotelegraphic and radiotelephonic stations having for object a scientific or educational purpose.

9. All applications for licences for radiotelegraphic and radiotelephonic installations must contain :—

(a) The exact indication of the person or institution making the application and their legal residence.

(b) The nature and purpose for the licence, the place or places where it is proposed to instal the station or stations, and their presumed zone of service.

(c) The detailed plans for the construction and technical quality of the installation, indicating in a detailed manner the nature and power thereof.

(d) The period for which the licence is asked.

(e) The period required before starting the station.

(f) The receipt of the amount to constitute the deposit-guarantee, as per Art. 13 and 14.

Such a deposit must be paid to the cashier of the local Provincial Director of Posts and Telegraphs by the applicant for the licence.

10. Every contract by the licensee, having for object the hire, amalgamation, partial or complete transference of the licence or licences, cannot take place before obtaining in advance the approval of the Government.

11. The licence is considered as expired should the licensee fail to complete and have ready for service the radiotelegraphic or radiotelephonic installation within the time stipulated as per paragraph (e) Art. 9.

The licence is considered as expired on the death of the licensee.

12. The officials of the State Telegraphic Administration shall be responsible for the maintenance of the installation and proper up-keep of the radiotelegraphic and radiotelephonic land stations for which a licence is granted ; they shall satisfy themselves that the licensee observes the law and the present regulations and that the licensee fulfils all the obligations imposed upon him by his contract with the Government.

13. Every licensee for a radiotelegraphic or radiotelephonic installation for private use, excepting the cases considered in Art. 8, will pay in advance to the State an annual fixed tax of £1t.50.

To guarantee the said tax the licensee must make a deposit as guarantee equal to the amount of fixed tax for one year.

14. Every licensee for radiotelegraphic or radiotelephonic installations for public use will pay every year to the State in quarterly

instalments a tax corresponding to 10 per cent. of the revenue from radiotelegraphic or radiotelephonic charges on the basis of the common tariff.

To guarantee the said tax the licensee will make a deposit as guarantee of not less than £It.200. If after one year the guarantee shows to be less than the amount due to the State for one year, then the deposit must be brought to the level of such proportion.

15. The period of the licence and the obligation of the tax established by Articles 13 and 14, begin from the month following the decree granting the licence.

16. The deposits as per Arts. 13 and 14 will be forfeited to the public exchequer in case of withdrawal or termination of a licence.

Should the licensee fail to provide for the payment of the taxes due as per Arts. 13 and 14, the Government will apply the deposit, which should be increased in its integral amount within ten days of the said confiscation.

SECTION 4.

17. *Qualifications for the Radiotelegraphic and Radiotelephonic Service.*—The staff necessary for the management and working of the radiotelegraphic and radiotelephonic service is appointed as follows:—

(a) For the stations under the control of the Ministry of Post and Telegraphs, from amongst the officials of specialists of first, second, third and fourth class.

(b) For the stations under the control of the Ministry of War, amongst the officers and privates of the engineers of the R. Army.

(c) For the stations under the control of the Admiralty, from amongst the officers of the staff and the marines.

Should it at any time be found convenient to the management and working of the above-mentioned stations, a mixed staff selected from the three Administrations can be employed.

The Ministry of the Posts and Telegraphs can for an educational purpose always send its own staff to the radiotelegraphic and radiotelephonic commercial stations by making previous arrangements with the interested Administration.

18. The staff to be employed in the radiotelegraphic stations licensed to private persons must possess a certificate proving their professional ability.

Such a document is granted either by the Ministry of Posts and Telegraphs, or by the Admiralty, according to the service for which it is intended.

SECTION 5.

19. *Limitations to the use of Radiotelegraphic and Radiotelephonic Apparatus.*—Cargo and passenger vessels are prohibited from using their own radiotelegraphic or radiotelephonic stations when they are at anchor in the State waters, except in cases of giving warning of danger or appeals for help, or when they are about to sail, or for urgent reasons within half an hour after their arrival and when the communication with the land is cut off for special reasons or for sanitary measures.

A breach of this rule will render the transgressor liable to the penalties imposed by Art. 3 of the law.

SECTION 6.

20. *Taxes*.—The tax for one radiotelegram is composed :—

- (a) Of the radiotelegraphic tax due to the coast station ;
- (b) Of the radiotelegraphic tax due to the station on board ;
- (c) Of the telegraphic tax.

For taxation purposes only those radiotelegrams exchanged with Ship stations are considered.

21. All the radiotelegraphic and radiotelephonic stations installed before the promulgation of the law must apply for a licence within one calendar month of the present regulation.

C The following paragraph relating to Wireless Telegraphy is taken from the "Law of June 30th, 1912," which contains regulations concerning marine, commercial and postal services :—

"The undertakers (of said services) are obliged to adopt (on board their ships) . . . wireless telegraph and telephone apparatus, whose system and power will be indicated, and, if necessary, modified by the Ministry of the Navy."

D *The OFFICIAL STATUTE BOOK of the Kingdom of Italy contains the following decree, numbered 1587 and dated at Rome November 12th, 1916.*

In pursuance of the law of May 22nd, 1915, No. 671, which confers extraordinary powers on His Majesty's Government and in pursuance of the law of June 30th, 1910, No. 395, and the relative regulations appertaining thereto, approved by Royal Decree of February 1st, 1912, No. 227, and in pursuance of the Royal Decree of July 11th, 1913, No. 1006, which gives effect to the International Radiotelegraphic Convention of London ; and the Ministers in Council having given due consideration to the proposals placed before them by the Ministers of Maritime and Railway Transports and of Marine, in concert with the Minister of Posts and Telegraphs ;

We have decreed and we hereby decree :—

ART. 1.—All vessels of commerce, whether propelled mechanically or by sails, whether they transport passengers or not, if they have on board a total of fifty persons or more, must, whilst at sea, carry an equipment of radiotelegraphic apparatus.

ART. 2.—From this obligation are exempted vessels on which the number of persons on board is exceptionally and accidentally increased to fifty or more, on account of *force majeure* or because the captain has been obliged to increase the number of his crew to make up for those who are ill, or on account of his having been obliged to transport persons picked up at sea or other persons.

There are also exempted from this obligation :

(1) Vessels which during their voyage do not travel at a distance of more than 150 nautical miles from the nearest coast.

(2) Vessels on which the number of persons present on board is exceptionally or eventually increased to fifty or more, after embarkation, during a part of the voyage, of extra hands which it is found necessary to bring in for the handling of goods ; on condition, however, that the aforementioned vessels do not perform trans-oceanic voyages and that, during the above-mentioned part of their voyage, they remain within thirty degrees latitude north and south.

(3) Sailing vessels of primitive construction, whose build renders it impossible for them to be equipped with radiotelegraphic apparatus.

ART. 3.—Vessels, which by virtue of Art. 1 above-mentioned are required to be equipped with radiotelegraphic plant, are, as regards the Radiotelegraphic Service, divided into three classes, according to the classification of ship stations (prescribed by Article XIII.b) of the regulations annexed to the Radiotelegraphic Convention, signed in London on July 5th, 1912, viz. :—

First Class.—Vessels possessing continuous wireless service. In this first class are included vessels able to carry on board twenty-five passengers or more :—

(i) If they have an average speed of fifteen knots or more.

(ii) If they have an average speed of over thirteen knots, but only on the double condition (a) that they have on board 200 persons or more (passengers and crew), and (b) that they perform, during their voyage, a journey of over 500 nautical miles between two consecutive ports of call. It is, however, allowable for these vessels to be included in the second class on condition that the listening-in service be continuous.

Second Class.—Vessels possessing a wireless service limited to certain hours.

In the second class are included vessels able to carry on board twenty-five passengers or more, if they are not, for other reasons, included in the first class.

Vessels of the second class must, whilst at sea, keep a permanent listening-in service of at least seven hours per day, and must, in addition, listen-in for ten minutes at the beginning of each of the remaining hours.

Third Class.—Vessels possessing a wireless service with no fixed hours of working.

In the third class are included all vessels which are not included in the first or second classes.

The owner of a vessel included in the second or third class has the right to demand that, in the certificate which is issued to him, the vessel in question be allocated to a superior class, if the said vessel satisfies all the requirements of that class.

ART. 4.—Vessels which, by the terms of Article 1 (above) must be equipped with radiotelegraphic plant shall be required to maintain whilst at sea a continuous listening-in service, if the Government shall judge that it is useful for the safety of life at sea.

In any case a continuous watch is required by :—

1. Vessels which possess an average speed of over thirteen knots ; which have on board 200 persons or more ; and which perform during their voyage journeys of over 500 nautical miles between two consecutive ports of call, even when those vessels are classified in the second class.

2. Vessels of the second class, during the whole time when they are voyaging over 500 nautical miles distant from the nearest coast.

3. Other vessels indicated in Article 1 when they are in the trans-Atlantic service ; or, whilst in other services, when their itinerary requires them to go over 1,000 nautical miles from the nearest coast.

Vessels used for all kinds of fishing purposes, including whalers which are required to be equipped with radiotelegraphic plant, are not obliged to maintain continuous listening service.

The continuous listening service can be performed by one or more telegraphists holding one of the certificates prescribed in Article X. of the regulations annexed to the International Radiotelegraphic Convention of 1912, and also, if necessary, by one or more qualified listeners. (*ascoltatori patentati*).

Nevertheless, should a reliable automatic alarm apparatus be invented, the continuous listening service may be maintained by means of that apparatus, after its use has been duly authorised by the Ministry of Maritime and Railway Transports.

By the term duly qualified listener (*ascoltatore brevettato*) shall be understood a person holding a certificate of competency issued by an administrative authority established for the purpose. To obtain such a certificate, the applicant shall be required to prove that he is competent to receive and to understand the radiotelegraphic distress signal and safety signal.

The registered owner shall take the necessary steps to provide that secrecy with regard to communications shall be respected by the qualified listeners in his employ.

ART. 5.—The radiotelegraphic apparatus obligatorily fitted in accordance with Article 1 must be able to transmit, by day, from vessel to vessel, signals clearly perceptible under normal circumstances and conditions, at a minimum distance of 100 nautical miles.

Every vessel obliged, under the terms of Article 1 above-mentioned, to be equipped with radiotelegraphic apparatus, must (in whatever category it may be classed) be fitted in conformity with Article XI. of the regulations annexed to the International Radiotelegraphic Convention of 1912, with an auxiliary radiotelegraphic apparatus, every part of which shall be kept in a location as absolutely secure as possible.

In any case, the auxiliary apparatus must be entirely situated in the upper parts of the vessel, as high up as may be found practicable.

The auxiliary apparatus shall, as provided in Article XI. of the regulations annexed to the International Radiotelegraphic Convention of 1912, possess a source of power devoted to that purpose alone. The apparatus must be capable of being speedily adjusted and employed besides being able to be worked for at least six hours, with a minimum range of eighty nautical miles for vessels of the first class, and of fifty nautical miles for vessels of the other two classes.

If the normal apparatus, the range of which under the terms of this article covers at least 100 nautical miles, satisfies all the conditions indicated above, there is no obligation to carry also an auxiliary apparatus.

ART. 6.—Every installation must, after the owner has sent in his request, and before it starts working, be inspected and approved by the competent authorities; the Certificate of Inspection, which constitutes a working licence, in accordance with Article IX. of the regulations annexed to the Radiotelegraphic Convention of 1912, shall contain details of the apparatus as far as they relate to the terms of the concession; it shall be drawn up in duplicate, and one copy thereof shall be handed to

the commander of the vessel ; but the copy shall not be thus issued if the apparatus does not comply with the conditions laid down in the Radiotelegraphic Convention of 1912 and in the present decree.

ART. 7.—Every captain of a vessel who receives a distress call from a vessel in danger is obliged to go to the help of those in danger.

The captain of every vessel in danger has the right to select from those vessels which have answered his call that vessel or vessels which he considers to be the most capable of affording him help. He should only avail himself of such right after having consulted, as far as possible, the captains of the vessels themselves. The latter are obliged to comply immediately with such request, going with all speed to the help of those in danger.

The captains of the vessels upon whom devolves the duty of rendering assistance are released from their obligations as soon as the captain or captains requisitioned have made known that they are ready to obey the requisition ; or as soon as the captain of one of the vessels which has reached the scene of the catastrophe shall have made known to them that their help is no longer necessary.

If the captain of a vessel finds it impossible, or does not consider it reasonable or necessary, under the special circumstances of the case, to go to the help of the vessel in danger, he immediately informs the captain of the latter. He must also enter in his log the full reasons prompting his decision.

ART. 8.—With regard to the terms of Article 1, ship-owners or their representatives shall, within fifteen days of the publication of the present decree, make application to the Ministry of Posts and Telegraphs for any concession required for existing vessels (in accordance with Article 1) not already equipped with radiotelegraphy and not excused from the installation of such apparatus under the provisions of Article 2.

When it is desired to nationalise any vessels after the date of the present decree, and such vessels come within the scope of the conditions laid down in Article 1, neither the necessary nationalisation papers nor any provisional certificate will be issued unless the shipowner shows that he has made the proper application for a licence to instal radiotelegraphic apparatus on board.

Existing licences, notwithstanding the provisions of Article 7 of the regulations regarding radiotelegraphy at present in force, shall remain valid throughout the duration of the war. On their expiry the shipowner shall make application for a renewal in accordance with the article above-mentioned ; moreover, it is further incumbent upon the shipowner to continue to work the ship station until the new licence has been obtained.

On the official licence there shall be entered a date on which each ship installation must be ready to work, this date will be estimated on the importance of the services for which vessel is destined, and in accordance with the opinion of the competent authorities.

For vessels which had a radiotelegraphic station, but which did not have the auxiliary apparatus required under the above-mentioned regulations, there is granted a period of one year from the date of the present decree to put the matter in order.

ART. 9.—Vessels whose owners shall not have made application for a radiotelegraphic licence within the period fixed by Article 8 ; or those whose owners, having obtained their licence, have nevertheless neglected to put the station in working order, either in accord with the above-mentioned provision, or in accord with the term-limit inserted in the licence itself, may be refused the right of working cargoes.

Whenever vessels which have not complied with their obligation to instal radiotelegraphic apparatus are obliged to put to sea either because they have public services to fulfil, or for any reasons of national importance, the Minister of Transports shall have the power to issue official instruction that the station shall be installed and put in working order at the expense of the owner of the vessel.

The same power is granted to the Minister of Transports in cases where the vessels referred to in Article 1 navigate waters outside the limits set forth in Article 2.

The expenses incurred for such official installation of apparatus and for the putting in working order of the same shall be recoverable in the manner indicated in Art. 205 of the laws governing the Mercantile Marine.

TEMPORARY PROVISIONS.

ART. 10.—It is therefore hereby rendered obligatory for the period of the war (and in any case, for not less than three years from the date of the licence) that all mechanically propelled mercantile vessels (of a gross tonnage of 2,000 or more in the case of cargo ships and of 1,500 tons or more in the case of passengers vessels) shall instal and maintain radiotelegraph stations in accordance with the existing laws and regulations, even although they are not compelled to apply for a radiotelegraph licence in accordance with Article 1.

ART. 11.—At the discretion of the Minister of Transports and following upon a request of the owners of the vessel, those vessels which perform voyages between ports of the Kingdom, excluding the Colonies, and which do not go beyond twenty miles from the coasts, may be relieved of the obligation set forth in the preceding article.

ART. 12.—The regulations contained in Articles 3 and 9 are intended to apply also to those vessels alluded to in these temporary provisions, except as regards the duration of the concession and the obligation to apply for its renewal. However, in the case of these vessels a special auxiliary plant is not indispensable and it will be sufficient if the range of the station do not fall below eighty nautical miles, and that it is possible for regular transmission to be carried out at any moment.

ART. 13.—The Commission for Insurance against war risks at sea, sitting at the "National Insurance Institute," in determining the premiums in respect of vessels, shall take into account the existence on board of radiotelegraph apparatus, whether temporary or permanent, in accordance with these temporary provisions.

ART. 14.—In order to ensure the working of the radiotelegraphic service on mercantile vessels, operators not indispensable for the Royal Army and for the Royal Navy, will be exempted from military service at the request of the Ministry of Maritime and Railway Transports.

ART. 15.—The present decree takes effect from the day of its publication in the *Official Gazette* of the Kingdom of Italy.

We order that the present decree, stamped with the seal of State, be inserted in the official collection of laws and decrees of the Kingdom of Italy, ordering that everyone whom it concerns may observe it or cause it to be observed.

Dated Rome, November 12th, 1916.

JAMAICA

(See WEST INDIES (BRITISH), page 535.)

JAPAN

THE total area of Japan is 24,794.36 square *ri* (the Japanese *ri* is about 2.5 English square miles. This is exclusive of Korea, Formosa, and Sakhalin, the sum of whose area amounts to 18,664.02 square *ri*. The realm ruled by the Emperor Yoshihito lies geographically between 21° 45' and 50° 56' north latitude, and between 119° 18' and 156° 32' east longitude.

The first wireless experiment in Japan was carried on, in 1896, according to the conduction method, and electric-wave telegraphy has formed a subject of Japanese research since 1897, its practical utility being first sufficiently proved by the experience of the Japanese Navy in the Russo-Japanese War. The first commercial wireless station was erected in May 1908, at Choshi, about 80 miles east of Tokyo. Since that time the number of stations have been largely increased, numbering now 62 Government stations and 53 private stations.

The Department of Communications controls all Government stations, and inspects all private stations in Japan. Besides these stations, the Korean Government has five Government stations, but they are not yet opened for public communication. The Formosan Government has one land station, and the Government General of Kwantung possesses three Government stations, all open for public communication. Besides these stations, there are many Navy and Army stations under the control of the Navy and the Army Departments.

Wireless work in the Department of Communications is divided into two sections: (a) The Research Laboratory, and (b) the Installation and Inspecting Section. Dr. W. Torikata is in charge of the former, and Mr. M. Saeki of the latter. Dr. W. Torikata co-operates with Mr. Eitaro Yokoyama, and Mr. M. Saeki with Mr. Toyokichi Nakagami. The following schedule shows the principal engineers and their chief assistants:

WIRELESS RESEARCH LABORATORY.

Official.	Title.	Address.
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WIRELESS INSTALLATION AND INSPECTING SECTION.

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There are three leading companies manufacturing wireless apparatus in Japan—the Annaka Wireless Works, Oki Electric Works, and Nippon Radio Works. Among these, the Annaka Works has the largest output, and has manufactured nearly 80 per cent. of Japanese wireless apparatus now in use.

The first wireless regulations in Japan were promulgated in April 1908, under the Telegraph Law of 1900. A number of additions and modifications have since been made of these regulations, and these are now incorporated in the Wireless Telegraph Law, which was promulgated and took effect in 1915. The texts of these laws and regulations now in force are shown in the following pages in accordance with the list below :

A—Wireless Telegraph Law No. 26.

B—Wireless Telegraph Regulations No. 16. (Japanese reference No. 41-48).

C—Foreign Wireless Telegraph Regulations.

D—Regulations relating to Private Wireless Telegraphs.

E—Regulations relating to Qualifying Examinations for Operators of Private Wireless Telegraphs.

WIRELESS TELEGRAPH LAW

(Law No. 26, June 19th, 1915.)

A ART. 1.—All wireless telegraphs and telephones shall be under the control of the Government.

ART. 2.—Wireless telegraphs and telephones referred to below may be privately established with the permission of the responsible Minister, to be determined by an Order.

(i) Installations on board vessels with the object of assuring safety to navigation.

(ii) Installations on board vessels for communication between vessels engaged in a specific business belonging to one person, with the object of facilitating such business.

(iii) Installations on board vessels or on land for the exclusive use of private persons and communicating with telegraph offices for the dispatch and receipt of telegrams, but disconnected from public telegraph, telephone, wireless telegraph or wireless telephone communications.



JAPANESE WIRELESS MEN AT FUNABASHI STATION.

Names (reading left to right): U. Ito, O. Kanaya, K. Yonemura (Chief Operator), C. Anazawa, S. Ono.

(iv) Installations on board vessels or on land with the object of facilitating a specific business belonging to one person by mutual communication on land or between land and vessel, disconnected from public telegraph, telephone, wireless telegraph or wireless telephone communications, but to which the preceding clause is not applicable.

(v) Installations with the exclusive object of carrying out experiments in connection with wireless telegraphy or telephony.

(vi) Installations recognised as necessary by the responsible Minister, but not coming within the purview of the preceding clauses.

ART. 3.—Restrictions relating to private wireless telegraph and telephone apparatus, their installation and employment, together with the qualifications of persons operating private wireless telegraphs, will be determined by an Order.

ART. 4.—Private wireless telegraphs and telephones must not be used for purposes other than those for which they were established. Provided that their use shall not be prevented for signals of distress at sea, meteorological reports, time signals and in other cases, to be determined by an Order, where public utility is recognised by the responsible Minister.

ART. 5.—Wireless telegraphs and telephones installed on foreign ships may only be used in accordance with the provisions of Article 2. Provided that their use shall not be prevented for Signals of Distress at sea and for communications with telegraph and telephone offices whilst on voyage.

ART. 6.—The responsible Minister may, by the issue of an Order, cause private wireless telegraphs or telephones to be used for the public service or for communications necessary for military purposes.

In cases coming within the purview of this Article the responsible Minister may, where deemed necessary, send officials to carry out the required operations.

ART. 7.—Where the responsible Minister deems it necessary in the interests of the public communications or on military grounds, he may withdraw his sanction from private wireless telegraphs or telephones or order changes in their equipment.

ART. 8.—Where the responsible Minister deems it necessary for the sake of public security, he may order a restriction of or suspension in the working of or the removal of instruments and accessories belonging to private wireless telegraphs or telephones or wireless telegraphs or telephones installed on foreign vessels.

In cases coming within the purview of this Article, the responsible Minister may, where deemed necessary, send competent officials to seal up instruments and accessories or to effect their removal.

ART. 9.—Where persons responsible for private wireless telegraphs or telephones have contravened this Law, Orders based on this Law, or provisions arising therefrom, the responsible Minister may withdraw his sanction from such wireless telegraphs or telephones or order the suspension of their operations.

ART. 10.—Where sanction has been withdrawn from wireless

telegraphs or telephones established by private persons, the dismantling of their apparatus and mountings will be required by order of the responsible Minister. This applies also in the case where private wireless telegraphs or telephones have ceased operations.

ART. 11.—Where private wireless telegraphs or telephones or wireless telegraphs or telephones established on foreign vessels have been called upon to deal with signals of distress at sea, such service must not be refused.

ART. 12.—Immediately on receipt of signals of distress at sea, wireless telegraphs or telephones shall acknowledge them and report to the wireless telegraph or telephone most conveniently situated for purposes of rescue.

in case In cases coming within the purview of this Article, where request has been made for communication on specific matters, such communication should immediately be made regardless of the provisions of this Article.

ART. 13.—Where the responsible Minister has ascertained that any person has illegally set up a wireless telegraph or telephone, he may appoint competent officials to enter such establishment, inspect the apparatus and mountings thereof, effect the removal of instruments and accessories, and take other steps appropriate to the circumstances.

ART. 14.—The Government may, for the purpose of establishing wireless telegraphs or telephones to meet the needs of public communications, require the use of part of a vessel, and in case of necessity order special provision and equipment. Under the provisions of this Article a suitable rent for accommodation and actual cost of special provision and equipment will be paid by the Government on application.

ART. 15.—Matters relating to the administration of wireless telegraphs, wireless telephones, telegraphs, telephones, mails, postal money orders and post office savings, or signals of distress at sea, time signals and meteorological reports may, as determined by an Order, be communicated free of charge by the wireless telegraphs or telephones provided for the public service.

ART. 16.—Persons who have set up wireless telegraphs or telephones without permission, or have made use of wireless telegraphs or telephones set up without permission, or those who have made use of private wireless telegraphs or telephones after permission has been withdrawn will be subject to imprisonment with hard labour for a period not exceeding one year or to a fine not exceeding one thousand yen.

In cases coming within the purview of this Article, where wireless telegraphs or telephones have been placed at the disposal of other persons in return for money or commodities, they shall be confiscated, and the total sum of money or value of commodities already disbursed or handed over shall be collected.

ART. 17.—Persons using private wireless telegraphs or telephones for purposes other than those for which they were established will be subject to a fine not exceeding one thousand yen.

In cases coming within the purview of this Article, where wireless telegraphs or telephones have been placed at the disposal of other

persons in return for money or commodities, they shall be confiscated, and the total sum of money or value of commodities already disbursed or handed over shall be collected.

Persons applying to and having messages sent by private wireless telegraphs or telephones will be subject to a fine not exceeding one hundred yen.

ART. 18.—Persons contravening the provisions of Article 5 or disobeying Orders based on this Law for restricting or suspending the use, changing the equipment of or removing or dismantling wireless telegraphs or telephones will be subject to a fine not exceeding one thousand yen. Where persons engaged in the business of wireless telegraphs or telephones have used them in opposition to Orders for their restriction or suspension, this provision shall apply also to such persons.

ART. 19.—Persons refusing without just cause to furnish the use of wireless telegraphs or telephones under the provisions of Article 6 or of vessels or failing to make special provision or equipment under the provisions of Article 14, will be subject to a fine not exceeding one thousand yen.

ART. 20.—Persons violating the secrecy of wireless telegraph or telephone messages coming under treatment at telegraph or telephone offices will be subject to imprisonment with hard labour for a period not exceeding one year or to a fine not exceeding two hundred yen.

Where persons engaged in the business of wireless telegraphs or telephones have divulged the secrets of messages under the provisions of this Article they will be subject to imprisonment with hard labour for a period not exceeding two years or to a fine not exceeding five hundred yen.

The offences dealt with in this Article must be established by prosecution.

ART. 21.—Persons illegally evading charges connected with wireless telegraphs or telephones or causing other persons to evade them will be subject to a fine not exceeding two hundred yen.

Where persons engaged in the business of wireless telegraphs or telephones have committed acts referred to in the preceding paragraph, they will be subject to imprisonment with hard labour for a period not exceeding one year or to a fine not exceeding five hundred yen.

ART. 22.—Persons dispatching false communications by wireless telegraph or telephone with the object of causing harm to other persons will be subject to imprisonment with hard labour for a period not exceeding two years or to a fine not exceeding five hundred yen.

Persons dispatching false communications by wireless telegraph or telephone with the object of adversely affecting the public welfare will be subject to penal servitude for a period not exceeding five years or to a fine not exceeding one thousand yen.

Persons dispatching by wireless telegraph or telephone reports of shipping casualties when there are in fact no shipping casualties will be subject to imprisonment with hard labour for a period of not less than three months and not exceeding ten years.

Persons engaged in the business of wireless telegraphs or telephones who have committed acts referred to in the first clause will be subject to imprisonment with hard labour for a period not exceeding

five years or a fine not exceeding one thousand yen ; in the second clause to penal servitude for a period not exceeding ten years ; in the third clause to a term of imprisonment with hard labour of not less than one year.

ART. 23.—Where persons engaged in the business of wireless telegraphs have without just cause opened, damaged, concealed or thrown away telegrams sent by wireless telegraphy and coming under treatment at telegraph offices, or have delivered them to persons other than their proper recipients, they will be subject to penal servitude for a period not exceeding three years or to a fine not exceeding five hundred yen. Provided that cases coming within the purview of Articles 258 and 259 of the Criminal Code shall be dealt with according to that Code.

ART. 24.—Where persons engaged in the business of wireless telegraphs or telephones have, without just cause, neglected to deal with general public telegrams or communications necessary for military purposes, or have caused them to be delayed, they will be subject to imprisonment with hard labour for a period not exceeding one year or to a fine not exceeding two hundred yen.

Where persons engaged in the business of wireless telegraphs or telephones have, without just cause, failed to deal with reports of distress to vessels under the provisions of Articles 11 or 12, or have caused them to be delayed, they will be subject to a term of imprisonment with hard labour of not less than one year.

Persons obstructing communication of reports of distress at sea will similarly be dealt with under the preceding clause.

ART. 25.—Persons obstructing, or committing acts calculated to obstruct, general public communications or communications necessary for military purposes sent by wireless telegraph or telephone will be subject to penal servitude for a period not exceeding seven years or a fine not exceeding five hundred yen.

ART. 26.—Unconsummated attempts to contravene the provisions of the last ten Articles are punishable.

ART. 27.—Persons opposing, hampering or avoiding the competent officials appointed under this Law in the execution of their duty or failing to answer their questions or making false statements during the inspection required under the provisions of Article 13 will be subject to a penalty not exceeding one hundred yen.

ART. 28.—The provisions of the Telegraph Law, Articles 4, 5, 11 to 21, 23, 24 and 45 apply to wireless telegraphs and telephones employed for the general public service and communications necessary for military purposes.

SUPPLEMENTARY REGULATION.—The date of coming into force of this Law will be fixed by Imperial Ordinance.

The above Wireless Telegraph Law came into force on November 1st, 1915 (Imperial Ordinance No. 186, October 25th, 1915.)

WIRELESS TELEGRAPH REGULATIONS NO. 16.

DATED APRIL 8TH, 1908.

B ART. 1.—The expression "wireless telegram" means any telegram to be transmitted by wireless telegraphy.

ART. 2.—In the present Regulations the term “coast station” means any telegraph office on land equipped with wireless telegraph apparatus, and the term “ship station” means any telegraph office on board a ship equipped with wireless telegraph apparatus.

ART. 3.—Wireless telegrams shall bear the following abbreviated instruction :—

“ R A ” in the case of Romanised telegrams.

ART. 4.—The name of a coast station through which a wireless telegram destined for a ship station is to be transmitted shall be indicated within parentheses in the address of the telegram, but such indication shall not be counted in the number of words even in the case of a Romanised telegram.

In case such coast station cannot transmit the telegram, but there is another coast station which is able to do so, the intermediary of the latter may be resorted to. If a telegram destined for a ship can be delivered direct to the addressee from a telegraph office on land, it may be delivered from such office without the use of wireless telegraphy.

(a) Wireless telegrams to be transmitted by way of intermediate ship station, with the exception of those handed in at a ship station, shall bear the following abbreviated instruction :—

“ R S ” in the case of Romanised telegrams.

Such intermediary transmission can in no circumstances be made more than once.

ART. 5.—If the sender of a wireless telegram destined for a ship station wishes to indicate the term during which his telegram is to be kept at the coast station, the number of days shall be inserted in the telegram as paid instruction.

Wireless telegrams without such instruction will be retained at the coast station for nine days from the day of handing in. However, in case the transmission of a telegram cannot be effected on account of the ship station's leaving out of the radius of action of the coast station or for any other reasons, the telegram may not be retained, if the retention is deemed unnecessary.

ART. 6.—If the sender wishes to prolong the term of retention mentioned in Art. 5, application to that effect shall be made to the coast station before the expiration of the term. The same applies to further prolongation of the term. In such case, the term of retention will be nine days, unless specially indicated.

The application shall contain the date of handing in, number of characters or words and the names of the sender and addressee of the wireless telegram.

The sender may make the application mentioned in Paragraph 1 through the office of origin. If he wishes it notified to the coast station by telegraph, he shall pay the charge for a paid service telegram for the purpose.

ART. 7.—The transmission of a wireless telegram is to be effected when both the sending and receiving offices are within the guaranteed range of action of each other.

ART. 8.—In the case of ships' distress, wireless telegrams informing the name of the ship in distress, the location and condition of the doomed vessel and any other particulars necessary for rescue, shall

be treated by coast or ship stations with absolute priority suspending all other communications.

ART. 9.—Paid service telegrams concerning enquiry, rectification, and stoppage of a wireless telegram to which reply is required can be exchanged only between telegraph offices on land.

ART. 10.—“Urgent telegrams,” “redirected telegrams,” and “telegrams with acknowledgment of receipt” are admissible between telegraph offices on land.

The sender of a wireless telegram with acknowledgment of receipt will be notified of the date and time at which the coast station has transmitted the telegram to the ship station.

(a) Telegrams of the same text originating from the same ship station or from the same telegraph office on land, and passing through the same coast station, may be made a multiple telegram, so far as concerns the transmission between wireless telegraph stations or between telegraph offices on land, as the case may be, no matter whether the addresses of such telegrams be in different localities or they be served by different offices of destination. The Telegram shall bear the following abbreviated instruction instead of that for an ordinary multiple telegram :

“SM” in the case of Romanised telegrams.

Paragraph 2 of Article 4 is not applicable to the multiple telegram mentioned in the preceding paragraph when it is to be distributed to two or more ship stations, unless every copy of such telegram can be transmitted through the same coast station or delivered from the same telegraph office on land.

(b) Reply-paid wireless telegrams shall bear the abbreviated instruction for “reply paid,” “urgent reply paid,” or “collated reply paid,” completed by the mention of the prepaid amount. If a prepaid amount is 60 sen in the case of *kana* telegrams, and 75 sen in the case of Romanised telegrams, the mention of the amount is not required.

ART. 11.—Wireless telegrams are subject to the following charge for the operation at a coast station or a ship station in addition to the ordinary telegraph charge. It is provided, however, that the ordinary telegraph charge is not levied on a telegram which is to be transmitted only by wireless telegraphy.

For Government and Ordinary Telegrams :

Coast charge : For a *kana* telegram, 20 sen up to fifteen characters, 5 sen for every addition five characters or less.
For a Romanised telegram, 25 sen up to five words, 5 sen for every additional word.

Ship charge : Ditto.

For Press Telegrams :

Coast charge : 20 sen for every fifty characters or fraction thereof.
Ship charge : Ditto.

(a) The following charge is levied in the same way as mentioned in the preceding Article on a supplementary copy of a multiple wireless telegram.

For Government and Ordinary Telegrams :

Coast charge : For a *kana* telegram, 10 sen.

For a Romanised telegram, 15 sen.

Ship charge : Ditto.

For Press Telegrams :

Coast charge : One-half the charge for the ordinary telegram.

Ship charge : Ditto.

(b) If, in the case where Paragraph 2 of Article 4 is applied, the amount paid fall insufficient, the deficiency is collected from the addressee. In the case of a multiple telegram, the amount to be collected is divided by the number of copies, and the quotient shall be the sum collected from one addressee.

ART. 12.—Wireless telegrams are free from special charge applicable to telegrams handed out of the ordinary hours of duty.

ART. 13.—The following charges for a wireless telegram shall be refunded less the amount which had been appropriated for another charge :—

(1) The charges pertaining to the transmission by wireless telegraph when not effected.

(2) The charges pertaining to the transmission on telegraph lines when not effected.

ART. 14.—An application for the refund of charges for a wireless telegram handed in at a ship station may be sent in through any telegraph office.

ART. 15.—The term of retention mentioned in Articles 5 and 6 is not reckoned in the period of delay giving rise to refunds.

ART. 16.—Matters not expressly provided for in this Ordinance are subject to the other regulations relating to inland telegrams, Provided that the Regulations relating to Telegrams, Articles 71, 114, 121, 126 to 130, 146 to 148, 148 (vi) to 148 (x), Ordinance No. 46, issued by the Department of Communications in September, 1900, shall not apply.

(a) With the exception of Article 9 to Article 10 (b) and the proviso in Article 16, the regulations in this Ordinance shall apply in the treatment of connected service between wireless telegraphs and the reciprocal dispatch and receipt of telegrams on land. Provided that, if deemed necessary by the Department of Communications, charges for such service shall be specially fixed.

The treatment of, and special fixing of charges for, wireless telegrams referred to in the preceding clause will be separately notified.

FOREIGN WIRELESS TELEGRAPH REGULATIONS.

C The following supplementary regulations came into operation on July 1st, 1913, and apply to all Japanese possessions :

ART. 1.—Foreign wireless telegrams are understood to be those which are treated according to the regulations of the London International Radiotelegraphic Convention or to the regulations concerning the radiotelegraphic service concluded between the Government of the Empire and foreign Governments or companies.

ART. 2.—The rates to be charged for foreign messages through Japanese coast and ship stations are as follows :—

- (1) Coast station rate, 24 yen (fr. 0.60) per word.
- (2) Ship station rate, 16 yen (fr. 0.40) per word.

The coast station rate referred to in the preceding paragraph includes the rate applicable to the transmission on telegraph lines for wireless messages originating in or destined for the Japanese Empire or Southern Manchuria or for ships' stations transmitted through Japanese coast stations and the Japanese telegraph service. As regards urgent wireless messages for transmission over land lines, an extra 10 yen (fr. 0.25) will be charged.

ART. 3.—The rates to be charged for foreign radiotelegrams through foreign coast or ship stations will be indicated separately.

ART. 4.—The ordinary rate for foreign wireless messages accepted by a Japanese ship station for transmission through a foreign coast station will be fixed by the owners of the said foreign coast station.

ART. 5.—For the acknowledgment of receipt of foreign wireless messages handed in at a Japanese telegraph office and destined for a ship station and transmitted thereto through a Japanese wireless coast station, the rate for the acknowledgment of receipt of interior telegrams for transmission between Japan and Southern Manchuria will be charged.

ART. 6.—At the request of the receiver, or of the person empowered to receive messages for and on behalf of the receiver, wireless messages may be retransmitted only over Japanese land lines.

ART. 7.—When the Japanese coast station given by the sender of a foreign wireless message destined for a ship cannot transmit the said message it may be transmitted through another Japanese coast station, provided such station is suitable for the purpose. This provision also applies in case the Japanese ship station cannot transmit a foreign wireless message to a Japanese coast station mentioned by the sender and where another Japanese coast station exists and which is capable of performing the duty.

ART. 8.—Japanese ship stations cancel foreign wireless messages when they are not in a position to transmit the same to the corresponding stations.

ART. 9. (i).—Should a foreign wireless message be cancelled in accordance with Article 8, the sender shall be at once advised and the money paid by him returned without delay.

(ii) Foreign wireless telegrams passing between the Imperial [Japanese] Telegraph Office in Shanghai and Imperial ship stations through the intermediary of Imperial coast stations and, as circumstances require, ship stations may be entered in the Japanese language.

(iii) Article 3, Article 4, clauses i and ii and Article 5, clause i, of the Wireless Telegraph Regulations, Ordinance No. 16 of the Department of Communications, issued in April 1908, provide for foreign wireless telegrams in Japanese.

(iv) Reply prepaid foreign wireless telegrams in Japanese must be marked "reply prepaid," followed by the amount paid for reply.

(v) Foreign wireless telegrams dispatched or received at the places announced separately will be transmitted through the intermediary of telegraph offices specially indicated.

(vi) The treatment of foreign wireless telegrams in accordance with the preceding Article is subject to the general regulations relating to foreign telegrams.

ART. 10.—Matters not specially provided for in this Ordinance, as regards Japanese telegrams, foreign telegrams in Japanese, and other items, are subject to the general regulations relating to foreign telegrams.

REGULATIONS RELATING TO PRIVATE WIRELESS TELEGRAPHS.

D (Ordinance No. 46, Department of Communications,
October 26th, 1915.)

ART. 1.—The words “ disconnected from public communications ” in clauses iii. and iv., Article 2, of the Wireless Telegraph Law mean that the location for fitting up private wireless telegraph apparatus must be outside the boundaries of direct telegram delivery or telephone subscription or on vessels on which no telegraph office is established.

ART. 2.—Wireless telegraphs set up in accordance with clause v., Article 1, of the Wireless Telegraph Law are limited to provision for experiments connected with the science and apparatus of wireless telegraphy.

ART. 3.—Permission will be given to the furnishing of vessels with aerial apparatus and its use for wireless telegraphy by private persons.

ART. 4.—The apparatus and equipment of private wireless telegraphs, except in specially indicated cases, will be required to conform with the following clauses.

(i) The apparatus must be capable of transmitting eighty *kana* characters or twenty European words per minute.

(ii) The receiving apparatus must be capable of receiving messages transmitted on electric wave-lengths of from 100 to 1,800 metres.

(iii) The power supplied to the transmitting circuit corresponding to the distance required to be reached in the daytime must not exceed the following standards (measured at the primary coil of the transformer or at some point corresponding thereto).

Required day-time distance.				Electric power.	
20 nautical miles, not exceeding				$\frac{1}{5}$	kilovolt amperes
100	“	“	“	$\frac{1}{2}$	“ “
200	“	“	“	1	“ “
300	“	“	“	2	“ “
400	“	“	“	3	“ “
500	“	“	“	7	“ “

(iv) The electric waves should be pure and suffer but little diminution. The installation must be capable of using waves of such length as may be specifically indicated, between 100 and 1,800 metres.

ART. 5.—The establishment and maintenance of private wireless telegraphs required to be installed at certain telegraph offices in accordance with clause iii., Article 2, of the Wireless Telegraph Law will be carried out by the Communications Office having local jurisdiction or a first-class post office dealing with branch administrative business.

Persons establishing private wireless telegraphs under this Article must be responsible for the supply of and expenditure on articles required for their establishment in accordance with details furnished by the Communications Office having local jurisdiction or the first-class post office dealing with branch administrative business, and must further pay expenses of maintenance.

ART. 6.—Persons proposing to establish private wireless telegraphs must append to their application documents inscribed with particulars under the following headings, submitting the whole to the Minister of Communications. Changes occurring under headings (i) to (iv) must similarly be notified.

- (i) The object of the installation and grounds for its necessity.
- (ii) Site of installation (full address or name of vessel).
- (iii) Plan of construction (nature of apparatus, method of mounting, height of electric standards [masts], electric power, distance required to be reached in the daytime, details of supplementary equipment where required).
- (iv) Hours open for operation.
- (v) Nature of vessel, gross tonnage, owners, course navigated, and regular port of mooring (the principal home port of anchorage should be taken as the regular port of mooring).
- (vi) Time required for completion.

The site of installation on vessels under heading ii. and the plan of construction under heading iii. should be illustrated by separate drawings.

ART. 7.—Where changes have been made in details under headings v. and vi. of the preceding Article, they must at once be notified to the Minister of Communications. In the case where the regular port of mooring has been changed such change must be notified also to the Communications Office having jurisdiction over, or the first-class post office dealing with branch administrative business at, the former port of mooring.

ART. 8.—When the fitting up and construction of a private wireless telegraph have been completed, the fact must at once be notified to the Minister of Communications.

ART. 9.—When the Minister of Communications has received a report under the preceding Article, he will send inspectors to examine the apparatus and fittings, after which a licence will be granted. Provided that where a special inspection is not deemed necessary a licence may be issued forthwith. If deemed specially desirable by the inspectors under this Article a temporary licence will be issued for the opening of operations by the private wireless telegraph concerned.

ART. 10.—When a private wireless telegraph establishment is to be closed up, a notification to this effect must be sent to the Minister of Communications seven days earlier. Similar notice must be given in the case of suspension of a private wireless telegraph establishment.

ART. 11.—When a private wireless telegraph establishment has been closed up, the aerials must be removed immediately and, unless special instructions have been given, apparatus specially pertaining to wireless telegraphy—dynamos, secondary electric batteries, distributing apparatus, electromotors, motor generators, transformers, electric standards, transmitters, receivers, meters, etc.—must be dismantled and removed within ten days. Where sanction to a private wireless telegraph has been withdrawn the same provision applies.

ART. 12.—When a change is made in the proprietorship of a wireless telegraph installation, a written application for permission, jointly signed with both old and new names, must be submitted to the Ministers of Communications.

Where, owing to succession on the decease of the proprietor or other causes, joint signatures cannot be obtained, a certificate to this effect must be appended to the application.

ART. 13.—The length of electric waves and the call signal to be adopted by a private wireless telegraph will be decided by the Minister of Communications.

ART. 14.—When a private wireless telegraph has been sanctioned by the Minister of Communications details of the installation under the following headings will be officially announced. This applies also to changes effected therein :

- (i) Name of person setting up installation.
- (ii) Object of installation.
- (iii) Site of establishment.
- (iv) Call signal.
- (v) Ordinary range of distance.
- (vi) Method of fitting up.
- (vii) Electric wave-length used.
- (viii) Hours open for operation.

ART. 15.—Operators of private wireless telegraphs are required to possess the proper qualifications in conformity with the Regulations relating to Qualifying Examinations for Operators of Private Wireless Telegraphs. Provided that exception be made in the case of operators of private wireless telegraphs established in accordance with clause v., Article 2, of the Wireless Telegraph Law, who have received the special sanction of the Minister of Communications.

ART. 16.—Proprietors of private wireless telegraphs must notify the Minister of Communications of all appointments or dismissals of operators in their employ. In the case of appointments, copies of antecedents form, certificate of physical examination and certificate of eligibility awarded on qualifying examination for operators of private wireless telegraphs must be appended.

ART. 17.—Where the Minister of Communications has ascertained that an operator of a private wireless telegraph is incompetent in the performance of his duties he may order the dismissal of such operator.

ART. 18.—A private wireless telegraph establishment shall not begin operations until a licence or temporary licence has been received in accordance with Article 9.

ART. 19.—When a private wireless telegraph establishment has begun operations the Minister of Communications must at once be notified accordingly. Provided that when the installation is one set up in accordance with clause iii., Article 2, of the Wireless Telegraph Law, notification will be required seven days before the opening of operations.

This Article applies also to reopening of operations after notification of suspension has been made in accordance with Article 10.

ART. 20.—The employment of private wireless telegraphs is required to conform with the following paragraphs. Provided that exception be made in the case of communications falling within the purview of Articles 22 to 24.

(i) Only when not causing disturbance to messages sent by the general public or to military communications.

(ii) In the case of installations on vessels, only whilst on voyage.

(iii) In the case of installations set up in conformity with clause v., Article 2, of the Wireless Telegraph Law, only when not causing disturbance to communications from other wireless telegraphs.

ART. 21.—Communications sent by private wireless telegraphs must be in Morse symbols, and the method of transmission, except where special instructions are issued, must conform with the following provisions :

(i) Before making a call, the receiver must be regulated to the best degree of perception to determine whether a message is already in transmission. A call must not be made until such message, if any, is completed.

(ii) When making a call the "begin communication" signal — — — — must first be sent, followed by the call signal of the party signalled, repeated three times, then the introductory signal — — — followed by own call signal, repeated three times.

(iii) When the signalled party replies, he must send the "begin communication" signal — — — — followed by the signalling party's call signal repeated three times, then the introductory signal — — — followed by his own call signal and the "clear for transmission" signal — — —. This applies also in the case of a reply to the call under provision vi.

(iv) When there is no reply from the signalled party to the call made under provision ii., repeat the signals in proper order three times at intervals of two minutes. If there is still no reply allow fifteen minutes to elapse, then make the call again in the same manner.

(v) When communicating with the signalled party by means of the international shipping signals, continue the call by sending the international shipping signal PRB.

(vi) When wishing to detect a wireless message within own range, use the "Inquiry signal" — — — — — and make the call provided under ii.

(vii) When the signalled party replies, begin the required message immediately, and at its ending send the "end com-

munication " signal - - - - - and own call signal, followed by the "clear for transmission" signal - - - - -

(viii) When the signalled party has comprehended the message, he must immediately signify its receipt by sending the signal "understand communication" - - - - -

(ix) When mutual messages have been completed, both parties must exchange the "finished" signal - - - - - and their own call signals.

(x) When in the case of an experimental message sent by a wireless telegraph established in accordance with clause v., Article 2, of the Wireless Telegraph Law, the call signal of another party is not required, repeat own call signal three times, and after ascertaining that there is no danger of hindering another message, begin the required communication, and at its ending send the "end communication" signal - - - - - and own call signal. Provided that such communication must not exceed twenty minutes in duration.

ART. 22.—When dispatching a signal of distress at sea by private wireless telegraph, the preliminary "ship in danger" signal - - - - - should be repeated at frequent intervals according to circumstances, followed by the name of vessel in distress, position, and details of conditions and other matters likely to facilitate rescue. If it is desired to get into touch with a specified wireless telegraph a continued series of the "ship in danger" signal - - - - - should be followed by the call signal of the station signalled.

ART. 23.—When a private wireless telegraph detects the "ship in danger" signal - - - - - accompanying a message of distress at sea, it must suspend all other messages and immediately reply, and report details in the order specified in the last Article to another wireless telegraph situated at the most convenient point for purposes of rescue. Provided that where the message of distress includes a request for specified action before transmitting the report or for specified items to be included therein, such request must be complied with.

In the case of a continued series of the "ship in danger" signal - - - - - being followed by the call signal of a specified station, only in the event of no reply being received therefrom should the responsive steps be taken prescribed in the last paragraph.

ART. 24.—When sending out by private wireless telegraph a necessary warning of danger to navigation, repeat the preliminary navigation alarm signal TTT ten times at short intervals, then transmit necessary details, after which, allowing an interval of ten minutes to elapse, repeat the alarm three times. When a private wireless telegraph detects the navigation alarm signal TTT accompanying a necessary warning of danger to navigation, it must suspend all other messages.

ART. 25.—A private wireless telegraph shall not be prevented, in cases of messages coming under the provisions of the last three Articles only, from exceeding the prescribed limit of electric power or wave-length used. Provided that, immediately after such use, the prescribed limits shall be reverted to.

ART. 26.—When a telegraph office has sent out by wireless telegraphy the private "suspend communication" signal - - - - -

all private wireless telegraph messages within such office's range of distance must be suspended until the private "renew communication" signal - - - - - is issued.

ART. 27.—A private wireless telegraph shall not be prevented, in the cases referred to below, from operating outside the objects for which it was established.

(i) When deemed necessary to exchange messages with other wireless telegraphs concerning communications coming within the purview of Articles 22 to 24.

(ii) When deemed necessary to exchange messages with other wireless telegraphs in connection with meteorological and time signals or the adjustment of apparatus.

(iii) When rendered necessary to communicate with a telegraph office equipped with wireless telegraph apparatus, following instructions issued by such office.

(iv) When deemed necessary to exchange messages with military wireless telegraphs to meet the requirements of military communications.

ART. 28.—When a private wireless telegraph has received a request from another wireless telegraph to exchange messages for the purpose of adjusting apparatus, it shall respond thereto, provided there is no danger of obstruction.

ART. 29.—The Minister of Communications shall specially instruct the Wireless Telegraph Inspection Bureau to test a private wireless telegraph with a view to ascertaining whether it is properly employed and whether its communications are in order.

ART. 30.—When sending instructions to a private wireless telegraph relating to its communications, the Wireless Telegraph Inspection Bureau will prefix to its call signal the wireless telegraph inspecting signal - - - - - in order to distinguish its message from general communications.

ART. 31.—Where an order is sent direct to an operator relating to the restriction or suspension of operations by the private wireless telegraph operated by him or the removal of its apparatus and accessories, the person responsible for the installation will be separately notified.

ART. 32.—When a vessel with a private wireless telegraph on board comes within the wireless telegraph range of a telegraph office it must briefly report to such office its direction and distance therefrom, together with the direction in which the vessel is moving. When about to withdraw from the range of such office, a similar report must be sent.

ART. 33.—The person responsible for a private wireless telegraph must report to the Minister of Communications, at the same time giving details, on all circumstances falling under the following headings:

(i) When special restrictions have been imposed on the equipment and operation of the wireless telegraph concerned in foreign waters. Provided that exception be made where such restriction has been officially announced.

(ii) When messages have been sent in accordance with Articles 22-24.

(iii) When cases of contravention of the Wireless Telegraph Law or the Regulations connected therewith on the part of a private or foreign wireless telegraph have been detected.

(iv) When matters have arisen calling for special attention in regard to the results of wireless telegraphy or other features.

ART. 34.—The person responsible for a private wireless telegraph must keep a journal and cause the operator to record therein the items coming under the following headings :

(i) Time of beginning and end of messages ; and wireless station signalled.

(ii) Nature of message.

(iii) The circumstances coming under Articles 27 and 33, and the steps taken in accordance therewith.

(iv) In the case of private wireless telegraphs established in accordance with clause v, Article 2, of the Wireless Telegraph Law, the results of experiments.

(v) In addition to the matters under the above headings, references for future use.

Communication journals as prescribed in this Article must be preserved for fifteen months, counting from the month following that in which they are completed.

ART. 35.—The person responsible for a private wireless telegraph must affix in his operating room, where they can easily be seen, his certificate, together with copies of the penal clauses of the Wireless Telegraph Law and a list of the essential objects for which the installation was established.

ART. 36.—The Minister of Communications will from time to time specially send officials to examine reports, and documents connected therewith, on the apparatus, mounting and operations of private wireless telegraphs. In such cases the officials concerned will carry proof of their competency.

ART. 37.—Documents to be sent in under the provisions of Articles 7, 8, 10, and 19 may be replaced by telegrams.

ART. 38.—Documents to be submitted under this Ordinance to the Minister of Communications, with the exception of those coming under the preceding Article, must all be passed through the Communications Office having jurisdiction over, or the first-class post office dealing with branch administrative business at, the place of a land installation or the regular port of mooring of a vessel having an installation.

Supplementary Regulations.

ART. 39.—The provisions of Articles 1 to 3, 5 to 14, 18 to 20, 22 to 38 apply to private wireless telephones, and the provisions of Articles 22 to 24, 26, 29 to 31 and 36 apply to wireless telegraphs or telephones installed on foreign vessels.

ART. 40.—This Ordinance comes into force on November 1st, 1915.

REGULATIONS RELATING TO QUALIFYING EXAMINATIONS FOR
OPERATORS OF PRIVATE WIRELESS TELEGRAPHS.

E (Ordinance No. 48 of the Department of Communications,
October 26th, 1915.)

ART. 1.—Persons aged 17 or above qualifying for posts as operators of private wireless telegraphs will be examined and approved according to the following classification :

Class I.—Persons capable of operating private wireless telegraphs set up under the provisions of the Wireless Telegraph Law, Article 2.

Class II.—Persons capable of acting as assistant operators of private wireless telegraphs set up under the provisions of the Wireless Telegraph Law, Article 2 (except those set up under clause iii) and of private wireless telegraphs set up under the provisions of clause iii of the same Article.

Class III.—Persons capable of acting as assistant operators of private wireless telegraphs set up under the provisions of the Wireless Telegraph Law, Article 2, clause v, and of private wireless telegraphs set up under the provisions of any one of the clauses of the same Article.

ART. 2.—Examinations will be carried out by the Qualifying Examination Committee for Operators of Private Wireless Telegraphs appointed by the Minister of Communications. The subjects for examination are as follow :

(1) Wireless Telegraphy : Theory (for Class I. only), adjustment and use of apparatus (for Classes I. and II. only).

(2) Practical Electric Telegraphy : Transmission of a message in Japanese and a European language and reception of a message by sounder. Standard of speed to be—for Class I., eighty *katakana* characters (syllables) or twenty European words per minute ; and for Classes II. and III., fifty *katakana* characters (syllables) or twelve European words per minute.

(3) Wireless Telegraph Laws and Regulations : General Laws and Ordinances relating to wireless telegraphs (for Classes I. and II. only) ; Laws and Ordinances relating to private wireless telegraphs (for Class III. only).

(4) English language : Rudiments (for Classes I. and II. only).

ART. 3.—The Minister of Communications will award certificates of eligibility (form No. 1) to successful candidates in the examination.

ART. 4.—Persons who have had not less than two years' practical experience in the public telegraph or wireless telegraph service or in military wireless telegraphy may be granted certificates of eligibility according to the following classification without undergoing examination, on review by the Qualifying Examination Committee for Operators of Private Wireless Telegraphs.

(1) Persons engaged in the public wireless telegraph service—for Class I. or lower.

(2) Persons engaged in military wireless telegraphy—for Class II. or lower.

(3) Persons engaged in the public telegraph service—for Class III.

These provisions apply also in the case of persons holding second or third-class certificates of eligibility according to the following classification :

(1) Persons holding second-class certificates of eligibility who have been engaged for not less than two years as assistant operators of private wireless telegraphs established in accordance with the Wireless Telegraph Law, Article 2, clause iii.—for Class I.

(2) Persons holding third-class certificates of eligibility who have been engaged for not less than two years as assistant operators of private wireless telegraphs—for Class II.

ART. 5.—Persons holding a certificate of study for completion of training in wireless telegraphy, practical electric telegraphy, and Wireless Telegraph Laws and Regulations, in accordance with the classifications determined by the Ministry of Communications, with the object of engaging in wireless telegraphy, may be granted certificates of eligibility, for Class I. or lower, on review.

ART. 6.—Examinations will be held annually. Date, place and other details thereof will be announced in the *Official Gazette*. Provided that if deemed necessary by the Minister of Communications extra examinations may be held at special times.

Reviews by the examiners will take place according to circumstances.

ART. 7.—Candidates for examination must submit to the Minister of Communications before the appointed date an application in writing (form No. 2), appending thereto a statement of antecedents (form No. 3), an abstract of the Census Register, and a photograph

ART. 8.—Candidates for examination must pay an examination fee of two yen in Class I. and one yen in Classes II. and III., affixing to the application form a revenue stamp for the amount.

Fees already paid for examination cannot be refunded to candidates failing to pass the examination or to those disqualified under the provisions of Article 9.

ART. 9.—Where the Qualifying Examination Committee for Operators of Private Wireless Telegraphs have detected false statements in a form of antecedents or improper behaviour during examination, they will disqualify the candidate concerned.

Where the facts of a case coming under the provisions of this Article are discovered after the candidate has passed the examination, his certificate of eligibility will be invalidated.

ART. 10.—The names of successful candidates will be announced in the *Official Gazette*.

ART. 11.—Where a holder of a certificate of eligibility has changed his name or lost or damaged his certificate, he may apply to the Minister of Communications for a revision or renewal thereof.

Applicants under this provision must pay a fee of thirty sen for revision or renewal of certificate, affixing to the letter of application a revenue stamp for the amount.

Additional Regulation.

This Ordinance comes into force on November 1st, 1915.

(Form No. 1.)

Certificate of Eligibility awarded on Qualifying Examination for Operators of Private Wireless Telegraphs.

Name
 Address
 Date of Birth
 Eligible for Class No.

This is to certify that the above-named is qualified in the class designated in accordance with the Regulations relating to Qualifying Examinations for Operators of Private Wireless Telegraphs.

Name (seal)
 President of Qualifying Examination Committee for
 Operators of Private Wireless Telegraphs.

Date.....

The certification of the President of the Qualifying Examination Committee for Operators of Private Wireless Telegraphs is sanctioned and a certificate of eligibility hereby granted.

(This certificate of eligibility falls within the category of Class A (B) certificates under the provisions of the Regulations relating to Business annexed to the International Wireless Telegraph Convention of London, and the holder of this certificate declares his acceptance of the obligation strictly to preserve the secrecy of communications under the whole of the Regulations.)

(Seal) Minister of Communications.

Date.....

Notes :—

(1) On the back, in the cases of Classes I. and II., appears a translation in a foreign language.

(2) The paragraph in parentheses appears in the cases of Classes I. and II.

(Form No. 2.)

Memorandum (on Mino paper).

Form of Application for Qualifying Examination for Operators of Private Wireless Telegraphs.

Affix
Revenue
Stamp
here.

Name of applicant.....
 Address
 Date of birth
 Class qualifying for: No.....

I am desirous of undergoing { examination to } qualify for
 { review by examiners to }
 the above Class in accordance with { the provisions of the } Regula-
 { Article 4 (or 5) of the } tions relating to Qualifying Examinations for Operators of Private
 Wireless Telegraphs, and append the documents required by Article 7
 of the same Regulations.

Name (seal)
 Present address
 Date.....

To the Minister of Communications.

(Form No. 3.)

Memorandum (on Mino paper).

Statement of Antecedents.

Name
Social status and domicile
Date of birth

Education :—

School	Section	Date of entry.
School	Section	Date of completion of
studies, graduation, or leaving school..... (abstract of		
graduation certificate or certificate of study appended).		

Occupation :—

Government office or private firm (fill in name).....
Date of Entry.....Occupation followed (references from
the Government office [or firm] appended).....

Awards or penalties :—

Description..... Date.....

The above is a correct statement.

Name (seal).....
Present address
Date.....

Note.—A detailed statement of matters relating to telegraphy or wireless telegraphy is required.

Attention is directed to the following points :

- (1) The applicant's name must be inscribed on the photograph.
- (2) The revenue stamp must not be cancelled.

LEEWARD ISLANDS

(See WEST INDIES (BRITISH), page 543.)

MALAYA

Comprising (1) The Federated Malay States ;

(2) Malay States not included in the Federation.

(1) FEDERATED STATES.

THE first division under which the component parts of Malaya are grouped consists of the Federated States. They lie on the mainland of the Malay Peninsula, and are closely connected with the Straits Settlements. They comprise the States of Perak, Selangor, Negri Sembilan, and Pahang, which have by a Treaty dated 1895 renewed their arrangements with the British Government. They are administered under the advice of a Chief Secretary with residents in each State, subject to the instructions of the High Commissioner, who is also Governor of the Straits Settlements, and resides at Singapore. The Chief Secretary to the Government is located at Kuala Lumpur. Their total area amounts to 27,506 square miles.

Wireless telegraphy is regulated by :

A—Enactment No. 7 of 1913, and

B—Rules under the above Enactment.

The text of both the enactment and the rules made under its provisions will be found below.

ENACTMENT NO. 7 OF 1913.

A An Enactment to make better provision for the regulation of Wireless Telegraphy.

(30th July, 1913.)

It is hereby enacted by the Rulers of the Federated Malay States in Council as follows :

1. (1) This Enactment may be cited as " The Wireless Telegraphy Enactment, 1913," and shall come into force upon the publication thereof in the *Gazette*.

(2) The Enactments specified in the schedule are amended by deleting from the interpretation of " Telegraph " in section 2 of each of the said Enactments the words " whether worked with or without lines of wires."

2. (1) In this Enactment

the expression " wireless telegraphy " means any system of communication by telegraph as defined by " The Telegraphs Enactments, 1905," without the aid of any wire connecting the points from and at which the messages or other communications are sent and received ;

The expression " locally owned ship " means a ship owned wholly by the Government of the Federated Malay States or of any of them or by subjects of any of the rulers of the said States or by bodies corporate established under and subject to the laws of the said States or of any of them and having their principal place of business within the said States or by any person residing within the said States.

(2) Nothing in this Enactment shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. The Chief Secretary to Government may, whenever he shall deem it expedient to do so, license the establishment of any wireless telegraph station or the installation or working of any apparatus for wireless telegraphy in any place in the Federated Malay States or on board any locally owned ship.

4. (1) No person shall establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place in the Federated Malay States or on board any locally owned ship except under and in accordance with a licence granted in that behalf by the Chief Secretary to Government.

(2) Every such licence shall be in such form and for such period as the Chief Secretary to Government may determine and shall contain such terms, conditions and restrictions on and subject to which the licence is granted as the Chief Secretary to Government shall consider desirable in the public interest.

5. (1) If any person establishes a wireless telegraph station without a licence in that behalf or installs or works any apparatus for wireless telegraphy without a licence in that behalf, he shall be liable to a fine not exceeding one thousand dollars or to imprisonment of either description for a term not exceeding twelve months and in either case be liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence, but no proceedings shall be taken against any person under this Enactment except with the previous sanction of the Public Prosecutor.

(2) If a Magistrate is satisfied by information on oath that there is reasonable ground for believing that a wireless telegraph station has been established without a licence in that behalf or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any ship within the jurisdiction without a licence in that behalf, he may grant a search warrant to any police officer to enter and inspect the station, place or ship and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

6. (1) The Chief Secretary to Government may make rules for all or any of the following matters :

(a) for prescribing the form and manner in which applications for licences under this Enactment are to be made ;

(b) for prescribing the fees payable on the grant of any licence ;

(c) for regulating the manner in which apparatus for wireless telegraphy on board a merchant ship, whether a locally owned ship, a British or a foreign ship, in the waters of the Federated Malay States shall be worked so as to prevent interference with naval signalling or the working of any wireless telegraph station lawfully established, installed or worked in the Federated Malay States or the waters thereof and so as not to interrupt or interfere with the transmission of any wireless messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea ;

(d) for prohibiting except with the special or general permission of the Director of Posts and Telegraphs, Federated Malay States, the working or using of any apparatus for wireless telegraphy on board a merchant ship, whether a locally owned ship, a British or a foreign ship, whilst such ship is in any of the harbours of the Federated Malay States ;

(e) for prohibiting or regulating, in case at any time in the opinion of the Chief Secretary to Government an emergency has arisen in which it is expedient for the public service that the Government should have control over the transmission of messages by wireless telegraphy on board merchant ships, whether locally owned ships, British or foreign ships in the waters of the Federated Malay States, the use of wireless telegraphy on board such ships while in such waters by such further rules as the Chief Secretary to Government may see fit to make from time to time and either in all cases or in such cases as may be deemed desirable.

(2) No rules made in respect of the matters described in paragraphs (c), (d) and (e) of sub-section (1) shall apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

7. When an applicant for a licence proves to the satisfaction of the Chief Secretary to Government that the sole object of obtaining the licence is to enable him to conduct experiments in wireless telegraphy, a licence for that purpose shall be granted subject to such special terms, conditions, and restrictions as the Chief Secretary to Government may think proper, but shall not be subject to any rent or royalty.

8. (1) Every omission or neglect to comply with and every act done or attempted to be done contrary to the provisions of this Enactment or of any rule made thereunder or in breach of the conditions and restrictions subject to or upon which any licence has been issued shall be deemed to be an offence against this Enactment and for every such offence not otherwise specially provided for the offender shall, in addition to the forfeiture of any articles seized, be liable to a fine not exceeding five hundred dollars.

(2) All convictions, forfeitures and fines under this Enactment or any rules made thereunder may be had and recovered before the Court of a Magistrate of the First Class.

SCHEDULE.

State.	No. and year.	Short title.
Perak	6 of 1905	The Telegraphs Enactment, 1905
Selangor	9 "	" " " "
Negri Sembilan	7 "	" " " "
Pahang	8 "	" " " "

RULES

UNDER "THE WIRELESS TELEGRAPHY ENACTMENT, 1913."

B In exercise of the powers vested in him by section 6 of "The Wireless Telegraphy Enactment, 1913," the Chief Secretary to Government has made the following rules :

1. All apparatus for wireless telegraphy on board a merchant ship, whether a locally owned ship, a British or a foreign ship, in the water of the Federated Malay States shall be worked in such a way as not to interfere with (a) Naval signalling or (b) the working of any wireless telegraph station lawfully established, installed or worked in the Federated Malay States or the waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. No apparatus for wireless telegraphy on board a merchant ship, whether a locally owned ship, a British or a foreign ship, shall be worked or used whilst such ship is in any of the harbours of the Federated Malay States except with the special or general permission of the Director of Posts and Telegraphs, Federated Malay States.

3. If at any time, in the opinion of the Chief Secretary to Government, an emergency has arisen in which it is expedient for the public service that the Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships, whether locally owned ships, British or foreign

ships, while in the waters of the Federated Malay States shall be subject to such further rules as may be made by the Chief Secretary to Government from time to time, and such rules may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

4. These rules shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

5. Expressions defined in "The Wireless Telegraphy Enactment, 1913," have in these rules the meanings thereby assigned to them.

(2) NON-FEDERATED MALAY STATES.

These comprise Johore, Kedah, Perlis, Kelantan and Trengganu. The relations of Johore with Great Britain are defined in the Treaty of 1885, amended by an agreement dated May 12th, 1914, whereby the Sultan exacts and acts upon the advice of a British officer called his General Adviser. With regard to the other four states, rights of suzerainty, administration and control were transferred by Siam to Great Britain under a Treaty dated March 10th, 1909.

Under present circumstances it is not possible to give any particulars relating to wireless telegraphy in these Non-Federated States.

MAURITIUS

MAURITIUS lies in the Indian Ocean, 500 miles east of Madagascar, and comprises a total area of about 720 square miles.

The Colony was formally ceded to Great Britain by the Treaty of Paris of 1814. Under letters patent of 1885, 1901, 1904, and 1912, partially representative institutions have been granted. The Administration of the Colony and its dependencies is vested in a Governor, assisted by an Executive Council and a Council of Government.

The legislation affecting Wireless Telegraphy in the Mauritius was originated by an Ordinance (No. 33) issued in 1903 investing the Governor with certain administrative powers. This was amended by the "Wireless Telegraphy" (Amendment) Ordinance (No. 25) of 1912. These have since been consolidated by the following

ORDINANCE NO. 11

AUGUST 22ND, 1913.

BE IT ENACTED by the Governor, with the advice and consent of the Council of Government, as follows:—

1. *Definition of "Wireless Telegraphy."*—In this Ordinance "Wireless Telegraphy" means any system of communication by telegraph without the aid of any wire connecting the points from and at which the messages or other communications are sent or received: Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

2. *Licence for "Wireless Telegraphy."*—(1) A person shall not establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place or on board any ship registered in the Colony except under and in accordance with a licence granted in that behalf by the Governor.

(2) Every such licence shall be in such form and for such period as the Governor may determine, and shall contain the terms, conditions and restrictions on and subject to which it is granted.

3. *Apparatus aboard ships*.—A person shall not work any apparatus for wireless telegraphy installed on any merchant ship, whether British or Foreign, while that ship is in the territorial waters of the Colony, otherwise than in accordance with regulations under this Ordinance.

4. *Regulations*.—(1) The Governor in Executive Council may from time to time make regulations for carrying into effect the purposes of this Ordinance.

(2) If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the territorial waters of the Colony shall be subject to such further regulations as may be made by the Governor from time to time, and such regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

5. *Search Warrant*.—If a Magistrate is satisfied by information on oath that there is reasonable ground for suspecting that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship without a licence in that behalf or contrary to the provisions of any regulations made under this Ordinance or of any licence granted under this Ordinance he may grant a search warrant to any police officer or any person appointed in that behalf by the Inspector General of Police and named in the warrant, and a warrant so granted shall authorise the police officer or person named therein to enter and inspect the station, place or ship and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

6. *Penalties*.—Any person who shall offend against any provision of this Ordinance or any of the regulations made thereunder shall be liable to a fine not exceeding five hundred rupees (Rs. 500) and upon such conviction the Court may order that any apparatus for wireless telegraphy in connection with which the offence was committed shall be seized and forfeited.

7. *Repeal clause*.—Ordinances Nos. 33 of 1903 and 25 of 1912 are repealed.

8. *Short Title*.—This Ordinance may be cited as "The Wireless Telegraphy (Amendment) Ordinance, 1913."

Passed in Council at Port Louis, Island of Mauritius, this twenty-ninth day of July, One thousand nine hundred and thirteen.

MEXICO

OCCUPYING an important position in the southern part of the Continent of North America, with an extensive seaboard both on the Atlantic and Pacific Oceans, Mexico stretches from 15° 0' to 32° 30' N. latitude, and lies between 87° 0' and 117° 0' W. longitude. It

covers an area of 768,883 square miles, and comprises 27 States and three Territories, besides the Federal District of Mexico.

As will be seen by reference to our "Land Stations" Section, Mexico contains a number of wireless installations; but owing to the period of internecine strife through which the country has passed during recent years, it is not possible under present conditions to print in these pages any legislative enactments or sets of rules governing their administration.

NETHERLANDS (KINGDOM OF THE)

THE official name of the Kingdom of Holland possesses the same signification as its old English title of the "Low Countries." During the fourteenth century the Countship of Holland and Earldom of Flanders became appanages of the Dukes of Burgundy, and through them passed under Spanish rule; which, tyrannically exercised, ended in the establishment of the Netherlands Republic. At the close of the seventeenth century the Stadtholdership was revived for a time in the person of William, Prince of Orange, who became King of England. The Batavian Republic (a combination of Holland and Belgium), was established by the French at the end of the eighteenth century, and this was later converted into a kingdom under Louis Bonaparte. The Orange family was recalled after Napoleon's fall; but Belgium seceded from the "United Kingdom" in 1830. The present Queen Wilhelmina is a scion of the House of Orange.

The eleven provinces into which Holland is divided lie between $50^{\circ} 46'$ and $53^{\circ} 34'$ N. latitude, extending from $3^{\circ} 22'$ to $7^{\circ} 14'$ E. longitude. They cover a total area of 12,761 square miles. The two commercial capitals are Amsterdam and Rotterdam, the Court Capital and centre of administration being located at the Hague.

The regulation of radiotelegraphy was first instituted by including a few special clauses relating to wireless in the Telegraph and Telephone Act of 1904. A Royal Decree was promulgated under date of March 6th, 1905, reserving to the Minister of Waterways, Commerce, and Industries the right of prohibiting any electric apparatus which would interfere with the public telegraphs and telephones and Government radiotelegraphic stations. This was confirmed and supplemented by the Decree of July 11th, 1914. On May 10th, 1906, a further Royal Decree fixed a Provisional Tariff for the Telegraphic Communication of Wireless Reports and Distress Signals from ships at sea. The texts of these Acts and Decrees will be found below, so far as they appertain to radiotelegraphy.

In 1914 an appeal was presented to Parliament by the Minister of Waterways for addition to and modification of some articles of the Telegraph and Telephone Act of 1904 above referred to. The purpose of the appeal was to place it beyond any possibility of doubt, that this Act should relate also to wireless installations intended for private telegraphic and telephonic intercourse. Furthermore, this (proposed) Bill gives effect to Article IX, Paragraph 2, of the International Radiotelegraphic Service Regulations, which has references to licences for ship stations subject to foreign Governments. In 1916 a further Bill

was presented to Parliament by the Minister of Agriculture, Industries and Commerce, to give effect to the "International Convention for the Safety of Life at Sea."

Neither of these two Bills had been passed, at the time of going to Press, and we are not, therefore, in a position to publish their text.

At the outbreak of the present European war, the use of all amateur stations (including those which are only suitable for reception) was prohibited; but towards the close of 1917 facilities were granted to amateurs for the use of receiving stations, and some slight modifications of the earlier prohibition were rendered possible, provided that specific leave had been asked from and granted by the responsible Government authorities.

PUBLIC DEPARTMENTS CONTROLLING WIRELESS TELEGRAPH OPERATIONS.

Official.	Title.	Address.
Minister Lely ...	Minister of Waterways...	zigne Excellentie den Minister van Waterstraat te s'Gravenhage
Mr. G. A. A. Alting von gensau	Director General of Posts and Telegraphs	den Heer Directeur Generaal van Posterijen en Telegrafie te s'Gravenhage
Mr. A. Collette ...	Chief Engineer, Director of Telegraphs	den Heer Hoofdingenieur Directeur der Telegrafie te s'Gravenhage
Mr. H. J. Nierstrasz	Chief of the Radiotelegraphic Service	den Heer Chef van den Technischen Dienst der Radiotelegrafie te Scheveningenhaven

The Netherlands possess important colonies in the East Indies as well as in South America, and the wireless laws and regulations current in those colonies are appended in the following pages.

The text (so far as radiotelegraphy is concerned) of the following enactments figure below :—

A—Telegraph and Telephone Act, 1904.

B—Royal Decree 6th March, 1905.

C—Royal Decree of the 10th May, 1906.

D—War Office Circular of 12th September, 1917.

E—Regulation for Colony of Curaçao.

F—Regulation for Dutch East Indies.

TELEGRAPH AND TELEPHONE ACT OF 1904.

A The Telegraph and Telephone Act of 1904 mainly refers to the ordinary wired services, and it has not been judged worth while, therefore, to reprint it in full here.

According to Article II. of this Act, a licence granted by the Queen is necessary before telegraphs and telephones can be established, or worked by private enterprise. The Act also contains the terms under which the licence is issued and the conditions binding on the licensee.

Both of the above provisions of the 1904 Act are applicable to wireless telegraphy.

B Article I. of the Royal Decree of March 6th, 1905, supplemented and amended under the Decree of July 11th, 1914, bears reference to wireless telegraphy :—

ARTICLE I.

Unless provided with a permit from the Minister of Waterways, Commerce and Industries, and subject to observance of the conditions and stipulations therein contained for the purpose of preventing interference with the exploitation of telegraphs and telephones intended for public traffic, it is forbidden to lay down or to use the following :—

1. (a) Any electric conductors above ground for lighting purposes or for the transmission of power at a distance of less than 6 metres measured in horizontal projection from any overground conductor belonging to the telegraphs and telephones intended for public traffic.

(b) Any other electric conductor above the ground at a distance of less than 2 metres measured in horizontal projection from any conductor above ground belonging to the telegraphs and telephones intended for public traffic.

2. Any underground electric conductors at a distance of less than 0.50 metre from any underground conductor belonging to telegraphs and telephones intended for public traffic.

3. Any electric installation intended for non-public telegraphic and telephonic intercourse by means of apparatus which are not connected with one another at the terminal points by wires or conductors.

Among the conductors referred to under 1 and 2, electric conductors within buildings are not included.

Among the installations referred to under 3 shall not be included plants the apparatus of which are only suitable for the reception of radiotelegraphic signals, unless the plants are provided with an antenna placed within 1,500 metres of a Government station for radiotelegraphy and more than 30 metres high above the ground.

The permit referred to under 1, 2, and 3 above, is not required for electric conductors and installations which are already in use when this general working regulation comes into force.

C Decree of May 10th, 1906, relating to the fixing of provisional tariff for telegraphic communications for reports and distress signals received by radiotelegraphic means from ships at sea.

ART 1.—The Government Office with radiotelegraphic service at Scheveningen Harbour shall report by telegraph, to those who have notified themselves for the purpose, the communications from ships and distress signals received by way of radiotelegraphy.

ART 2.—The reports referred to in Article 1 shall be supplied within the Netherlands subject to the payment by the addressee of a coast charge of 1 florin for the present for each communication, increased by an amount of 50 cents if the telegram to be drawn up does not contain more than 10 words, and of 25 cents above this for each successive 10 words or fraction thereof.

Nevertheless, the reports herein mentioned may also be supplied against such a fixed price per year as shall be fixed by our Minister of Waterways, Commerce and Industry for each interested party, taking into consideration both the number and the extent of the required information and also the above-named tariff.

In supplying the reports referred to in this Article to interested parties outside the Netherlands, the above-mentioned costs will be increased by the foreign telegraphic tariff applying thereto.

ART. 3.—This Decree shall come into operation on the second day after the date of the *Staatsblad* and the *Staatscourant* in which it is published.

Our Minister of Waterways, Commerce and Industry is entrusted with the execution of this Decree, which shall be published simultaneously in the *Staatsblad* and in the *Staatscourant*, and a copy whereof shall be sent to the State Council.

WAR OFFICE CIRCULAR.

September 12th, 1917.

D 1. *Cancels* the announcements made on August 5th, 1914, (*Buitengewoons Staatscourant*) (Extra Official Paper) No. 181 of August 5th, 1914, prohibiting the use of wireless telegraphy.

2. *Declares* that what is prohibited in the European territory of the Realm is :—

(a) To possess without authorisation of the Minister for War any complete transmitting apparatus for wireless telegraphy.

(b) To possess without such authorisation parts which are suitable to be used as component parts of wireless transmitter, of which the primary emergency can be increased to more than 30 watts, or which may be used without any additions to aërials of a wireless transmitter.

This prohibition does not refer to official installations or vessels belonging to the State.

The Military and Technical Department of the Royal Telegraph Service are responsible for the execution of said prohibition.

REGULATIONS FOR TELEGRAPH SERVICE IN THE DUTCH COLONY OF CURACAO.

Publication No. 52 of 1909. (21st September.)

E The Governor of Curaçao, in view of the desirability of replacing by new regulations the decree of the 30th October, 1873, regulating the inland and foreign telegraph communication of the colony as well as that of the 27th September, 1884, regulating telephonic communication, and having received the sanction of the Colonial Council, has determined on the following decree :—

ART. 1.—In this decree it is understood that telegraphs and telephones refer to the usual line-telegraphs and telephones as well as to radio-telegraphs and telephones.

ART. 2.—No telegraphs and telephones may be installed on any of the islands of the colony by others than the Government, unless a special permit is granted. Besides the special conditions, made in each case, the general rules are :—

(a) The erection, maintenance and exploitation should be carried out to the satisfaction of the Governor.

(b) The tariffs, conditions of use and service regulations must be submitted for the approval of the Governor.

(c) The concession may be granted absolutely or conditionally, but for no longer period than 25 years.

(d) The concession may be withdrawn by the Governor if the above rules or the special conditions are not followed.

ART. 3.—It is forbidden, without the permission of the Governor, to use radio-telegraphs or telephones, fitted on board foreign or private-owned Dutch ships, in the ports or anchorages of the colony, unless in special circumstances, the exigencies of good seamanship render it necessary to do so.

ART. 4.—Everybody may make use of telegraphs and telephones under the existing regulations. The transmission of telegrams or the conversation by telephone may be stopped or refused if in conflict with the safety of the colony, public order, or common decency.

The reasons for refusal or stoppage should be communicated to the party concerned.

The decision of the Governor may be invoked in such cases.

ART. 5.—For the public interest the Governor may put telegraph and telephone service under control or partially suspend it for an indefinite period.

ART. 6.—In case of war, or if any of the islands of the colony be placed under martial law, if so desired the telegraphs and telephones may be put under Government control.

ART. 7.—Imprisonment of one day to six months and fines from 10 florins to 1,000 florins conjointly or separately will be inflicted on those who erect or exploit telegraphs and telephones, without the permission required as specified in Art. 2 ; or who on board private-owned ships, make unlawful use of the same (Art. 3).

The instruments may, in so far as they are owned by the guilty parties, be confiscated.

ART. 8.—Anyone who wilfully damages or destroys telegraph and telephone works, including cables, in use for public benefit, will be punished with imprisonment from three months to three years.

Anyone who causes such damage as is referred to above, through neglect, may be punished with imprisonment of one day to one month or a fine of 1 florin to 100 florins.

ART. 9.—Deals with the punishment of crimes committed in which telephones are used.

ART. 10.—Libellous, offensive and indecent expressions used over the telephone, will be considered as uttered in public.

ART. 11.—Violation of the secrecy of telegraphs and telephones is punishable in accordance with Arts. 137 and 327 of the existing law.

ART. 12.—Owners of property have to allow, if it is necessary, work to be done on it in connection with the erection of public telegraphs.

ARTS. 13, 14, 15 and 16 deal with the use of private property in the erection of telegraph and telephone lines.

ART. 17.—All precautions should be taken to prevent lightning being conducted along cables or lines.

ART. 18.—The above may be referred to as "Telegraaf- en Telefoon-Verordening 1909," adding the number of the publication.

ART. 19.—Decrees of 30th October, 1873 (P.B. 1874, No. 1) and of 27th September, 1884 (P.B. 1884, No. 14) as well as P.B. 1892, No. 27 are withdrawn.

ART. 20.—Concessions relating to the erection of telegraphs and telephones on any of the islands of the Colony of Curaçao, granted before this decree comes into force, will be treated as coming under the regulations in force when they were made.

REGULATIONS FOR TELEGRAPH SERVICE IN THE DUTCH EAST INDIES.

6th October, 1876.

F The old regulations issued by decree of 31st March, 1858, concerning the electro-magnetic telegraphs should now be superseded and new regulations as hereunder be brought into force.

Regulations concerning the erection and use of telegraphs in the Dutch East Indies.

ART. 1.—No telegraphs may be erected or used without permission of the Government, except those exclusively owned and used privately.

ART. 2.—The conditions for permission to erect such telegraphs will be fixed in each case separately.

ART. 3.—The Governor-General has the right to take possession of all telegraphs or to stop their exploitation.

ART. 4.—If telegraphs are erected without permission open for public traffic, a fine of from 200 florins to 1,000 florins can be inflicted.

ART. 5.—Owners of property have to allow, if it is necessary, work to be done on it in connection with the erection of public telegraphs.

ART. 6.—They should give access to officials and not interfere with the work done and the lines erected.

ART. 7.—If they refuse access they will be fined from 25 florins to 100 florins.

ART. 8.—They have a right to compensation for damage done to their property.

ART. 9.—Everybody has a right to have telegrams sent under the conditions laid down in the service regulations.

ART. 10.—The State or the Telegraph Company is not responsible for the transmission of telegrams in general or within a certain time.

ART. 11.—Punishment for embezzlement or opening of telegrams, communication of their contents to outsiders, etc., will be inflicted in accordance with the existing laws.

ART. 11*a*.—Telegrams, the contents of which are of danger to the State, or in conflict with the law, or of an obscene character, will not be accepted or delivered.

ART. 12.—Punishment in accordance with the existing laws is to be inflicted on every official who falsifies telegrams and on those who knowingly profit by the misuse of such telegrams.

ART. 13.—Damage to telegraph works or material is punishable with imprisonment and penal servitude.

ART. 14.—The Head of the Local Council may order, on request of the Chief of the Telegraph Service, the removal of everything impeding the efficiency of that service.

The above was published in the *Official Gazette (Staatsblad)* of the Dutch East Indies, and the regulations also apply to Telegraphs or Telephones, whereby the apparatus at both ends is not connected with wires or conductors (decree of 7th December, 1903. *Staatsblad* No. 405).

NEWFOUNDLAND

THE Island of Newfoundland lies between $46^{\circ} 37'$ and $52^{\circ} 39'$ north latitude; its longitude stretching from $52^{\circ} 35'$ to $59^{\circ} 25'$ west. Its north-western side is bounded by the Gulf of St. Lawrence, whilst the Straits of Belle Isle divide it from the North American Continent. It is triangular in shape (almost equilateral), with Cape Bauld on the north, Cape Race on the south-east, and Cape Ray on the south-west.

Newfoundland ranks as the oldest British Colony, having been formally occupied by Sir Humphrey Gilbert in August, 1583. A Governor was first appointed in 1728, and in 1855 "Responsible Government" was accorded.

The Executive is vested in a Governor aided by an Executive Council with a legislature of two houses.

The Colony is proud of its association with the first wireless message flashed across the Atlantic. This was received by Senator Marconi himself on Signal Hill, an eminence overlooking the Narrows of St. John's. Newfoundlanders hope that ere long some suitable memorial may be erected on Signal Hill of this epoch-making event.

The Sealing Industry forms an important item in the industrial activities of the Colony, and the disaster of 1914 (wherein the *Southern Cross* was lost with all hands) led to the instalment of wireless equipment on the fleet of sealers, which was made compulsory by the passing of legislation to that effect.

General control over radiotelegraphy in the Colony is exercised by the Postmaster-General, Dr. Robinson, assisted by the Post Office Inspector, Mr. Wm. Campbell. Mr. H. W. Le Messurier, C.M.G., the Deputy Minister of Customs, refuses clearances to any vessels of Newfoundland Legislation not licensed in conformity with the Acts, or whose operators are not in possession of provisional service issued by the Postmaster-General. These certificates cover a period of six months, and are renewable. They are not granted until the applicant is pronounced proficient, the proving of such efficiency resting with the Marconi Wireless Telegraph Company, Ltd. of Canada, whose local manager, Mr. J. J. Collins, co-operates with the Postmaster-General.

No new land stations were opened during the year 1917, the most important wireless development having been the installation of plants on the coastal passenger steamship service. The general Regulation of Wireless is governed by the Post and Telegraph Acts, 1891 to 1906. The 1906 Act is printed below.

We subjoin :—

A—Act of 1905 (Cap. VII.).

B—Post and Telegraph Act, 1906.

C—Wireless Telegraphy (Steamers) Act, 1914.

D—Wireless Licence.

THE ACT OF 1905, CAP. VII.

A This act refers to taxes upon business transacted by telegraph and telephone companies within and in transit through the Colony. Clause 2, Section 2, reads as follows :

A sum equal to one per cent. in manner hereinafter provided of the total amount received by or due to the company in respect of all telegraphic messages passing over the land lines of the company or transmitted or received by any wireless method of telegraphy to or from any place within this Colony from or to any other place within this Colony during a period of twelve calendar months ending on the first day of May of each year : Provided that this sub-section shall not apply to messages which originate or are delivered in any place outside the Colony.

The first of such payments shall be made on the 30th day of June, 1906, in respect of the period of twelve months ending on the preceding first day of May.

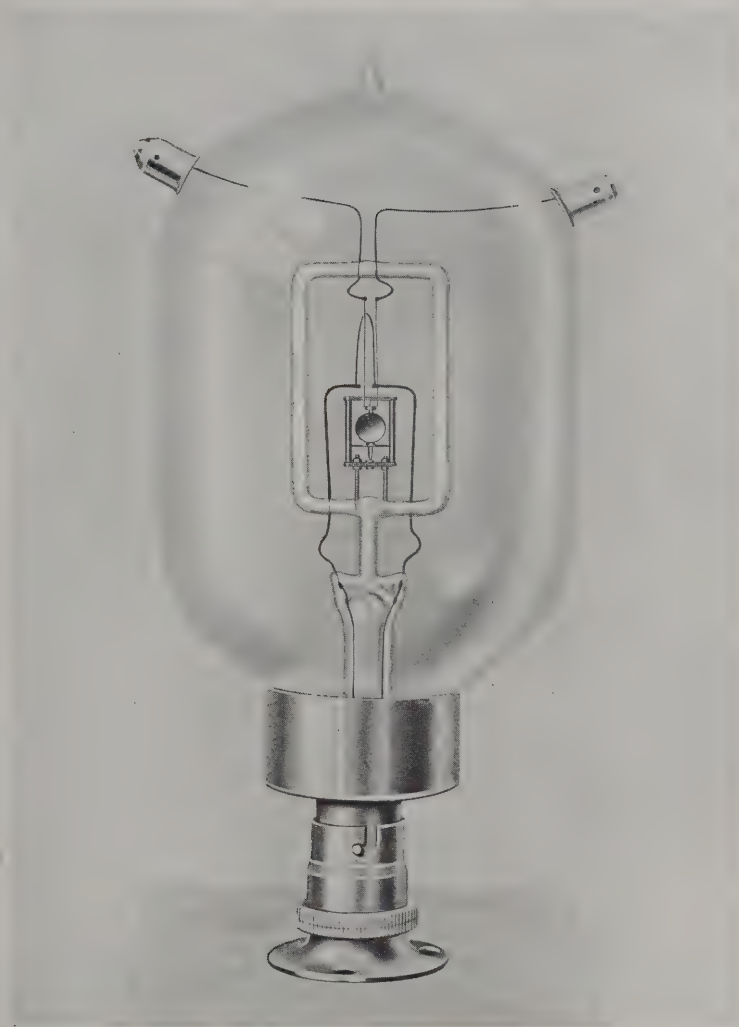
Section 4 of the same Clause (2) reads as follows :—

A sum of four thousand dollars (\$4,000) in respect of every wireless telegraph station or other means of communication by wireless methods of telegraphy between this Colony and any place, ship or vessel outside this Colony, for the time being belonging to or worked by or on behalf of the company which now is or hereafter shall be established in this Colony.

The first of such payments shall be made on the 30th day of June, 1906 : Provided that if the Governor in Council is satisfied that any such wireless telegraph station or other such means of communication is established for the purpose only of reporting passing ships or vessels, he may dispense the payment of such last-named sum and discharge the company from liability therefor in respect of such station or means of communication.

Clause 1 (1) of the Act of June 15th, 1905, Cap. XXI., reads :—

Whenever in the opinion of the Governor an emergency shall have arisen in which it is expedient for the public service that the Government of the Colony shall have control over the transmission of messages over any telegraph line, telephone line, or by any other form of telegraphy, it shall be lawful for the Governor in Council at any time to assume and for any length of time retain possession of any telegraph line, telephone, or any form of telegraphy in this Colony, and of all things necessary for the efficient working thereof, and may for the same



HOT-WIRE GALVANOMETER FOR MEASURING MINUTE H.F. CURRENTS.

[To face page 388.]

time require the exclusive service of the operators and other persons employed in working such telegraph line, telephone, or any form of telegraphy; and the company or other proprietor of such telegraph line, telephone, or any form of telegraphy, shall give up possession thereof, and the operators and other persons so employed shall, during the time of such possession, diligently and faithfully obey such orders and transmit and receive such despatches as they are required to receive and transmit by any officer duly authorised by the Governor in Council, and every company or other proprietor, operator or person violating any of the provisions of this section shall incur a penalty not exceeding one hundred dollars (\$100) for every refusal or neglect to comply with the requirements thereof, such penalty to be recovered by action in the name of the Minister of Finance and Customs, in a summary manner before a Stipendiary Magistrate or Justice of the Peace.

POST AND TELEGRAPH ACT, 1906.

B 1. (1) A person shall not establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy, in any place in this Colony, or on board any ship registered in this Colony, except under and in accordance with a licence granted in that behalf by the Postmaster-General, with the consent of the Governor in Council.

(2) Every such licence shall be in such form and for such period as the Postmaster-General may determine, and shall contain the terms conditions, and restrictions on and subject to which the licence is granted, and any such licence may include two or more stations, places or ships.

(3) If any person establishes a wireless telegraph station without a licence in that behalf, or installs or works any apparatus for wireless telegraphy without a licence in that behalf, he shall be guilty of a misdemeanour, and be liable on conviction in a summary manner before a Stipendiary Magistrate to a penalty not exceeding fifty dollars, and on conviction on indictment to a fine not exceeding five hundred dollars or to imprisonment, with or without hard labour, for a term not exceeding twelve months, and in either case be liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence, but no proceedings shall be taken against any person under this Act except by order of the Postmaster-General.

(4) If a Stipendiary Magistrate is satisfied by information on oath that there is reasonable ground for supposing that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any ship as aforesaid without a licence in that behalf, he may grant a search warrant to any police officer or any officer appointed in that behalf by the Postmaster-General, and named in the warrant, and a warrant so granted shall authorise the officer named therein to enter and inspect the station, place or ship, and to seize any apparatus which appears to him to be used, or intended to be used, for wireless telegraphy therein.

(5) When a fine under this Act is imposed by a Court, Judge or Magistrate, and the master or owner of any ship is ordered to pay the

same and the same is not paid at the time and in the manner prescribed, the Court, Judge, or Magistrate making the order may, in addition to any other powers they may have for the purpose of compelling payment, direct the amount remaining unpaid to be levied by distress and sale of the ship, her tackle, furniture and apparel.

(6) The Postmaster-General may make regulations for prescribing the form and manner in which applications for licences under this Act are to be made, and, with the consent of the Governor in Council, the fees payable on the grant of any such licence.

(7) The expression "wireless telegraphy" means any system of communication by telegraph as defined in "The Post and Telegraph Acts, 1891 to 1904," without the aid of any wire connecting the points from and at which the messages or other communications are sent and received.

2. This Act shall be read with and form part of "The Post and Telegraph Acts, 1891 to 1904," and the said Acts and this Act may be cited as "The Post and Telegraph Acts, 1891 to 1906."

WIRELESS TELEGRAPHY (STEAMERS) ACT.

C The following Act respecting the provision of wireless telegraphy on steamers engaged in the trade of Newfoundland was passed on September 4th, 1914 :—

1. Every steamer to which this Act applies shall be provided :—

(1) With a wireless telegraph installation approved of by the Minister of Marine and Fisheries ;

(2) With at least one qualified wireless operator approved of by the Postmaster-General ;

(3) With a Morse signalling apparatus approved by the Minister of Marine and Fisheries ;

(4) With at least one person on board capable of operating such signalling apparatus and of reading signals from other ships.

2. The wireless telegraphy installation provided on a ship to which this Act applies shall be maintained in good order and shall be attended to by an operator qualified as aforesaid in accordance with rules and regulations to be made by the Governor in Council under this Act for the purposes thereof.

3. No steamer to which this Act applies shall receive a clearance at any Custom House for the Seal Fishery or otherwise unless and until the Collector is satisfied that the provisions of this Act in respect of said steamer have been complied with.

4. If any requirement of this Act is not complied with in the case of any steamer to which this Act applies, the master or owner shall be liable for each offence to a fine of twenty-five hundred dollars, to be recovered in a summary manner before a Stipendiary Magistrate.

5. This Act shall apply to any steamer which ordinarily is engaged in prosecuting the Seal fishery from any port of this Colony, when engaged in the Seal fishery or when carrying more than sixty persons ; and to any other vessel carrying passengers from or within this Colony when named by the Governor in Council in a Proclamation to be published in the *Royal Gazette*.

6. Nothing in this Act shall affect the obligation to obtain a licence for a wireless telegraphy installation under "The Postal and Telegraph Acts, 1891 to 1906," or prevent the Governor in Council or other person exercising a like control over such wireless telegraphy in times of war or otherwise as may be exercised in respect of other wireless telegraphy.

D The various Acts printed above affect the Regulations of Wireless Telegraphy in the Colony of Newfoundland, supplemented in actual working by regulations which appear in the form "W. 19 Ship Licence," which is "issued in accordance with the provisions of the London Convention 1912." This licence consists of twenty clauses and a schedule. Of these, Clauses 1 to 6 consist of the ordinary definitions of terms and provisions for good order in working.

Clause 7 reads as follows :—

7. (i) If and whenever any department of the Government shall require the licensee, his servants or agents to transmit, by means of the licensed apparatus, any message on His Majesty's service (including messages to and from ships of His Majesty's Royal Navy or Newfoundland or Canadian Government vessels), such messages shall have priority over all other messages, and the licensee, his servants and agents shall, as soon as reasonably may be, transmit the same, and shall, until transmission thereof, suspend transmission of all other messages, and the rates to be charged on such messages shall not exceed half the rates charged the ordinary public.

(ii) The licensee shall not be entitled to claim any compensation in respect of the suspension of the transmission of messages as aforesaid.

Clauses 8 and 9 provide respectively for transmission of Distress Signals and Secrecy, whilst Clauses 10, 11 and 12 provide for the inspection by the Postal Officials of the Register of Messages kept on board.

Clauses 13 to 16 inclusive are formal clauses specifying the jurisdiction exercised by the Postmaster-General.

Clause 17 reads as follows :—

17. (i) If, and whenever, in the opinion of the Postmaster-General or any officer in command of one of His Majesty's ships of war, an emergency shall have arisen in which it is expedient for the public service that the Government shall have control over the transmission of messages by the licensed apparatus, it shall be lawful for the said Postmaster-General, by warrant under his hand, to direct and cause the licensed apparatus or any part thereof to be taken possession of in the name and on behalf of His Majesty and to be used for His Majesty's service, and, subject thereto, for such ordinary services as to the said Postmaster-General may seem fit, and in that event, any person authorised by the said Postmaster-General may enter upon the stations of the licensee, and take possession thereof and use the same as aforesaid.

(2) The Postmaster-General or any officer in command of one of His Majesty's ships of war may when he considers such an emergency as aforesaid to have arisen, instead of taking possession of the stations of the licensee, direct and authorise such persons as he may think fit to assume the control of the transmission of messages by the licensed

apparatus, either wholly or partly and in such manner as he may direct, and such persons may enter upon the licensee's premises accordingly, or the said Postmaster-General or officer may direct the licensee to submit to him all messages tendered for transmission or arriving by the licensed apparatus or any class or classes of such messages, to stop or delay the transmission of any messages or deliver the same to him or his agent and generally to obey all such directions with reference to the transmission of messages as the said Postmaster-General or officer may prescribe, and the licensee shall obey and conform to all such directions.

(3) In any such case as aforesaid, if the licensee shows that during the exercise of any of the powers aforesaid, his receipts for the licensed apparatus with respect to which the said powers have been exercised have been less than his receipts from the same source during a corresponding period, the Government shall pay to the licensee, as compensation for any loss of profit sustained by the licensee by reason of the exercise by the Postmaster-General of any of the powers hereby reserved, such sum as may be settled between the Postmaster-General and the licensee by agreement or as in case of difference may be determined by arbitration. Provided always that no such compensation as aforesaid shall be paid if and so far as the powers hereby reserved to the Postmaster-General are exercised for the purpose of preventing direct communication with any of His Majesty's enemies, and, save with the consent of the Postmaster-General no such compensation shall be paid if and so far as the powers aforesaid are exercised for the purposes of preventing direct or suspected communication with any of His Majesty's enemies or of protecting the interests of His Majesty under the apprehension of impending war.

Clauses 18, 19, and 20 refer to Penalties and the inclusive privileges of the Postmaster-General.

The Schedule (above referred to) runs as follows:—

Name of Station.	Normal Range.	Description of Receiving Apparatus.	Wave Length.	Source of Power and Maximum Output.	Maximum Power taken by Transmitting Instruments.		Frequency of Alternator if any.	Ship Charge.
					Volts.	Amps.		

NOTE.

In 1906 an agreement was made under which the Marconi Wireless Telegraph Company of Canada undertook to operate all the Labrador stations during the fishing season of each year, the Newfoundland Government to pay the company an annual royalty, and the revenue accruing from this traffic to go to the latter, who further agreed to forward all traffic over the Newfoundland Government Postal Telegraph System.

The success of this arrangement prompted the Government to propose an extension of the system on the Labrador by two or more stations—the Marconi Company to erect and operate these stations on the terms provided in the agreement. In the summer of 1910 stations were accordingly erected by the Marconi Company at Cape Harrison and Mikkovik. In 1911 it was agreed to establish a station between Indian Harbour and Cape Harrison to complete the chain on the Labrador.

After further negotiations, an important agreement was executed in December, 1912, which covers the following points: The old agreement terminating in 1916 is extended for a further period of ten years terminating in 1926; all other undertakings entered into in the earlier agreement will be continued until 1926. The Marconi Company has erected and is operating a station at Fogo, on the East Coast of Newfoundland—this station to be the property of the Marconi Company, and to be exempt from the Government tax of \$4,000 during the term of the agreement.

NEW HEBRIDES

(See PACIFIC ISLANDS, page 419.)

NEW ZEALAND

THE Dominion of New Zealand lies about 1,200 miles south-east of the mainland of Australia, and consists of three main islands in the South Pacific Ocean, known as the North, South, and Stewart Islands. They stretch between $33^{\circ} 0'$ and $53^{\circ} 0'$ south latitude; their longitude varying from $160^{\circ} 0'$ east to $173^{\circ} 0'$ west. The Colony includes several groups of smaller islands, and lying at some distance from those which form the centre of the Dominion.

The initial discovery is attributed to the Dutch Explorer Abel Jansen Tasman, who visited the South Island on December 13th, 1642. The first settlement of Europeans was made in 1814, British sovereignty was proclaimed in 1840, and the independence of the Colony dates from the May 3rd, 1841. The constitution rests upon the Act of 1852, under which the Executive Authority is vested in a Governor assisted by a Council of Ministers with a legislature of two houses.

The first wireless installation was placed in the tower of the General Post Office at Wellington in June, 1910, and experiments were carried out with different wireless systems. Later on a "Telefunken" set was installed, and a wireless telegraph office opened for commercial work on July 26th, 1911. At that time there were not more than half a dozen ships fitted with wireless apparatus trading to the Dominion; now there are twenty-seven New Zealand registered ships carrying wireless apparatus, as well as a large number of vessels registered in other countries and trading to New Zealand ports.

On October 14th, 1912, the G.P.O. station was replaced by one of $2\frac{1}{2}$ kw. upon Mount Wakefield, immediately behind the City of Wellington. At this station, known as "Radio-Wellington," a continuous service is maintained.

On October 24th, 1912, a $2\frac{1}{2}$ -kw. station was established on the roof of the Post Office at Auckland.

The installation of a wireless set of $2\frac{1}{2}$ -kw. power on the Government cable steamer *Tutanekai*, was completed on June 20th, 1912. The equipment has been found to be of much service in aiding in the work of the repair of submarine cables.

A wireless station was opened at CHATHAM ISLANDS on September 18th, 1913, connecting this group of islands with the mainland of New Zealand and extending the range of communication eastward. Position: $47^{\circ} 57'$ south, $176^{\circ} 31'$ west. Hours: 9 a.m. to 1 p.m., 3 p.m. to 5 p.m., and 7 p.m. to midnight. The normal range of the above-mentioned $2\frac{1}{2}$ -kw. stations is 300 miles by day and 600 miles by night.

The high-power stations at Awanui and Awarua were opened for public business on December 18th, 1913. These stations are of 30-kw. primary power Telefunken system, and were undertaken primarily for defence purposes. They are required to communicate with Sydney during the day as well as at night. Position of Awanui: $34^{\circ} 54'$ south, $173^{\circ} 18'$ east; position of Awarua: $46^{\circ} 30'$ south, $168^{\circ} 23'$ east. Both stations observe the same hours—viz., 6.30 p.m. to midnight, but a continuous listening service is kept for distress signals.

The Post and Telegraph Department is responsible for the ADMINISTRATION of wireless telegraphy in New Zealand. The permanent head of this Department is the Secretary of the General Post Office at Wellington.

In July, 1914, Regulations were made for the control of ships carrying wireless telegraph apparatus while within the territorial waters of New Zealand. The Regulations relating to ship stations were also amended by new Regulations issued on September 7th, 1914.

No licences are granted for amateur or experimental stations in New Zealand and the erection of such stations is prohibited.

Official.	Title.	Address.
The Rt. Hon. Sir Joseph Ward, Bart, K.C.M.G., P.C.	Postmaster-General and Minister of Telegraphs	Wellington.
W. R. Morris, I.S.O.	Secretary, Post and Telegraph De- partment.	Wellington.
F. V. Waters	First Assistant Secretary	Wellington.
G. B. Dall	Assistant Secretary	Wellington.
J. Orchiston, M.I.E.E. ..	Chief Telegraph Engineer	Wellington.
T. Buckley	Chief Electrician	Wellington.
H. A. R. Huggins	Controller and Chief Accountant ..	Wellington.

A—Extracts from the Post and Telegraph Act (Part X.), 1908.

B—Extracts from Amendment Acts of 1911 and 1913.

C—Regulations under Act of 1913. (Ships not registered in New Zealand.)

D—Regulations (affecting ships registered in New Zealand).

E—Regulations as to ships being provided with Wireless (October 1913).

POSTS AND TELEGRAPHS ACT.

A The following extracts from Part X. of the Post and Telegraph Act 1908, and from the Post and Telegraph Amendment Acts, 1911 and 1913, relate to wireless telegraphy in the Dominion:—

162. The Governor may from time to time establish stations for the purpose of receiving and transmitting telegraph messages within New Zealand or between New Zealand and parts beyond

New Zealand by what is commonly known as "wireless telegraphy," including in that expression every method of transmitting messages by electricity otherwise than by wires, whether such method is in use at the time of the coming into operation of this Act, or is hereafter discovered or applied.

163. The provisions of Part VII. of this division of this Act shall, as far as is applicable, *mutatis mutandis*, extend and apply to stations established under this part of this Act, and to communications by wireless telegraphy.

164. Every person who erects, constructs, or establishes any station or plant capable of transmitting or receiving wireless-telegraphic signals without having first obtained the consent of the Governor in Council is liable to a fine not exceeding five hundred pounds, and any plant, machinery, instruments, and material used by him for such purpose may be forfeited and dealt with as the Minister directs.

Part VII. of this division of the Act referred to deals with the construction and regulation of electric lines. It authorises the Governor to establish electric lines and purchase lines and plant. He may make regulations as to the management, working and maintenance of any telegraph. Any officer or person employed in the working of any telegraph who improperly divulges the contents of any telegram transmitted or presented for transmission by such telegraph, or the purport of such telegram, is liable to a fine not exceeding one hundred pounds, or to imprisonment with hard labour for any period not exceeding six months.

EXTRACTS FROM AMENDMENT ACTS OF 1911 AND 1913.

POST AND TELEGRAPH (AMENDMENT) ACT, 1911.

B 3. (1) The Minister of Telegraphs may, in accordance with regulations to be made in that behalf by the Governor in Council, grant licences for the installation and working of apparatus for wireless telegraphy (within the meaning of Part X. of the principal Act) on board any ship registered in New Zealand, and whether on the high seas or in New Zealand waters.

(2) Subject to any such regulation, every such licence shall be in such form and for such period, and shall contain such terms, conditions, and restrictions, as the Minister of Telegraphs think fit.

(3) The Governor may by Order in Council make such regulation as he thinks proper as to the granting of such licences, and as to the form, period, terms, conditions, and restrictions thereof and as to the fees payable in respect thereof.

POST AND TELEGRAPH (AMENDMENT) ACT, 1913.

9. (1) The Governor may from time to time, by Order in Council, make such regulations as he thinks proper governing the use of wireless telegraph apparatus on merchant ships whether foreign ships or British ships not registered in New Zealand, while within the territorial waters of New Zealand.

(2) Such regulations may provide for the detention of any merchant ship on which a breach of the regulations has been made, pending the institution and determination of proceedings in respect of such breach and the recovery of any fine imposed in respect thereof.

REGULATIONS UNDER ACT OF 1913.

AFFECTING SHIPS NOT REGULATED IN NEW ZEALAND.

C The following regulations are for the control of ships carrying wireless telegraph apparatus while within territorial waters of New Zealand.

Whereas by Section 9 of the Post and Telegraph Amendment Act, 1913 (hereinafter termed "the said Act"), it is provided that the Governor may from time to time by Order in Council make such regulations as he thinks proper governing the use of wireless telegraph apparatus on merchant ships, whether foreign ships or British ships not registered in New Zealand, while within the territorial waters of New Zealand, and that such regulations may provide for the detention of any merchant ship on which a breach of the regulations has been made pending the institution and determination of proceedings in respect of such breach and the recovery of any fine imposed in respect thereof :

Now, therefore, His Excellency the Governor of the Dominion of New Zealand, in pursuance and exercise of the power and authority conferred upon him by the said Act, and acting by and with the advice and consent of the Executive Council of the said Dominion, doth hereby make the following regulations ; and doth hereby order that such regulations shall have effect on and from the date of publication of this Order in Council in the *New Zealand Gazette*.

FURTHER REGULATIONS.

1. In these regulations, if not inconsistent with the context :—

"Territorial waters of New Zealand" means and includes all tidal waters included within the Dominion of New Zealand, and all parts of the open sea within one marine league of the coasts of that Dominion measured from low-water mark.

"Minister of Telegraphs" means the Minister of Telegraphs for the time being.

"Wireless Telegraphy" has the same meaning as in Section 162 of the Post and Telegraph Act, 1908.

"Telegraph" has the same meaning as in Section 119 of the Post and Telegraph Act, 1908.

"Naval signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and naval stations, or between a ship of His Majesty's Navy or a naval station and any other wireless telegraph station, whether a coast station or a ship station.

"The Admiralty" means the Commissioners for executing the office of Lord High Admiral of the United Kingdom of Great Britain and Ireland.

“Coast station” means a wireless telegraph station which is established on land or on board a ship permanently moored, and which is open for the service of correspondence between the land and ships at sea.

“Ship station” means a wireless telegraph station established on board a ship which is not permanently moored.

2. These regulations shall apply only to foreign merchant ships and to British merchant ships not registered in New Zealand, while such British or foreign ships are within the territorial waters of New Zealand.

3. All apparatus for wireless telegraphy on board a merchant ship while in the territorial waters of New Zealand shall be worked in such a way as not to interfere with Naval signalling, or with the working of any wireless telegraph station lawfully established, installed, or worked in the Dominion of New Zealand or the territorial waters thereof; and, in particular, the said apparatus shall be so worked as not to interrupt or interfere with the transmission of messages between wireless telegraph stations established on ships at sea and wireless telegraph coast stations.

4. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used while such ship is in any of the harbours of the Dominion of New Zealand, except with the consent in writing of the Minister of Telegraphs.

5. The foregoing regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

6. If and whenever an emergency shall have arisen in which it is expedient in the public interest that His Majesty's Government shall have control over the transmission of messages by the said apparatus, it shall be lawful for any officer of His Majesty's Navy or Army, or for any other person authorised in that behalf by the Admiralty, or by the Minister of Telegraphs, to take possession of or to cause the said apparatus or any part thereof to be taken possession of in the name and on behalf of His Majesty, and to be used for His Majesty's service and subject thereto for such ordinary services as to the said officer or person may seem fit; and in that event any person authorised by the said officer or person may enter upon any ship on which such apparatus is installed and take possession of the said apparatus and use the same as aforesaid.

7. Any such officer or person may in such event as aforesaid, instead of taking possession of the said apparatus as aforesaid, direct and authorise such persons as he may think fit to assume the control of the transmission of messages by the said apparatus, either wholly or partly, and in such manner as he may direct, and such persons may enter upon any ship on which the said apparatus is installed accordingly; or the said officer or person may direct the person or persons in charge of the said apparatus to submit to him, or any person authorised by him, all messages tendered for transmission or arriving by the said apparatus, or any class or classes of such messages, to stop or delay the transmission of any messages, or deliver the same to him or his agent, and generally to obey all such directions with reference to the transmission of messages as the said officer or person may

prescribe, and the said person or persons in charge of the said apparatus shall obey and conform to all such directions.

8. If any breach of these regulations is committed by any person on board any ship while in the territorial waters of New Zealand, the person so committing the same and the owner and master of the ship shall be severally liable on summary conviction to a fine not exceeding £100.

9. Whenever the Minister of Telegraphs or the Secretary of the Post Office has reasonable cause to believe or suspect that any breach of these regulations has been committed on board any ship while in the territorial waters of New Zealand, he may give notice in writing to the Collector of Customs at any port in New Zealand to detain the ship, under Section 9 of the Post and Telegraph Amendment Act, 1913, until the sum of £100, or such smaller sum as may be specified in the notice, has been deposited with the Collector by or on behalf of the owner of the ship.

10. If on the receipt of that notice, or at any time within three months thereafter, the ship is found within such port, the Collector of Customs shall withhold the certificate of clearance of the ship, under Section 35 of the Customs Act, 1913, until and unless the aforesaid sum is deposited with him or the aforesaid notice of detention is withdrawn.

11. If within six months after the date of the offence in respect of which the ship has been detained a conviction for that offence is obtained against any person, the sum so deposited shall be available for the satisfaction of any fine and costs imposed or awarded by the conviction, and the residue, if any, shall be returned to the person by whom the deposit was made.

12. If within the period of six months aforesaid no such conviction is obtained, the sum so deposited shall be returned to the person by whom it was deposited.

WIRELESS TELEGRAPH REGULATIONS FOR SHIP STATIONS.

AFFECTING SHIPS REGISTERED IN NEW ZEALAND.

D Whereas by Order in Council dated the twentieth day of November, one thousand nine hundred and eleven, and published in the *New Zealand Gazette* of the twenty-third day of November one thousand nine hundred and eleven, regulations were made under the authority of the Post and Telegraph Amendment Act, 1911 (hereinafter termed "the said Act"), as to the granting of licences for the installation and working of apparatus for wireless telegraphy on board any ship registered in New Zealand, and whether on the high seas or in New Zealand waters, and as to the form, period, terms, conditions, and restrictions thereof, and as to the fees payable in respect thereof: And whereas it is desirable to revoke such regulations, and to make others in lieu thereof:

Now, therefore, His Excellency the Governor of the Dominion of New Zealand, in pursuance and exercise of the power and authority conferred upon him by the said Act, and of all other powers and authorities in that behalf enabling him, and acting by and with the advice and consent of the Executive Council of the said Dominion, doth

hereby revoke the regulations made by the above-mentioned Order in Council, and in lieu thereof doth hereby make the following regulations for the purposes hereinbefore mentioned ; and doth hereby order that such regulations and the revocation of the regulations first before recited shall have effect on and from the date of publication of this Order in Council in the *New Zealand Gazette*.

REGULATIONS.

1. In these regulations, if not inconsistent with the context :—

“ Minister of Telegraphs ” means the Minister of Telegraphs for the time being.

“ Wireless Telegraphy ” has the same meaning as in Section 162 of the Post and Telegraph Act, 1908.

“ Telegraph ” has the same meaning as in Section 119 of the Post and Telegraph Act, 1908.

“ Naval signalling ” means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty’s Navy, between ships of His Majesty’s Navy and naval stations, or between a ship of His Majesty’s Navy or a naval station and any other wireless telegraph station, whether a coast station or a ship station.

“ The Admiralty ” means the Commissioners for executing the office of Lord High Admiral of the United Kingdom of Great Britain and Ireland.

“ The International Telegraph Convention ” and “ the International Telegraph Regulations ” mean respectively the International Convention of St. Petersburg dated the 10th-22nd July, 1875, and the service regulations made thereunder ; and include respectively any modifications of the convention or regulations made from time to time.

“ The Radiotelegraph Convention, 1912,” means the convention signed at London on the 5th day of July, 1912, and the service regulations made thereunder ; and includes any modification of the convention or regulations made from time to time.

“ Coast station ” means a wireless telegraph station which is established on land or on board a ship permanently moored, and which is open for the service of correspondence between the land and ships at sea.

“ Ship station ” means a wireless telegraph station established on board a ship which is not permanently moored.

2. The Minister of Telegraphs may, at the request of any person or company desirous of establishing, installing, working, and using on ships belonging to such person or company, and registered in New Zealand, apparatus for wireless telegraphy, grant to such person or company (hereinafter called “ the licensee ”) a licence, in the form of the Schedule hereto, for the period, upon the terms, and subject to the conditions and restrictions hereinafter appearing.

3. Each ship station is bound to exchange radiotelegrams with any coast station, or with any other ship station, without distinction as to the radiotelegraph system adopted by that station.

4. Each ship station shall be of such class mentioned in Article 13 of the Service Regulations annexed to the Radiotelegraph Convention, 1912, as is specified in the licence issued in respect thereof, and the equipment of the station, hours of duty observed, and other requirements shall be appropriate to such class in accordance with the provisions of the Radiotelegraph Convention, 1912.

5. The apparatus used at all ship stations shall, as far as possible, be in keeping with scientific and technical progress. The waves emitted must be as pure and as little damped as possible.

6. The apparatus must be capable of transmitting and receiving at a speed of at least equal to twenty words per minute, the word being reckoned at the rate of five letters.

7. The apparatus shall be so constructed as to be capable of using wave-lengths of 600 to 300 metres as measured by the standard of measurement in use by the Post and Telegraph Department for the time being; and such other wave-lengths not exceeding 600 metres as shall be authorised from time to time by the Minister of Telegraphs: Provided always that the wave-length of 600 metres shall normally be used for communication, and, further, that the wave-length of 1,800 metres may be used for transmission in the exceptional case referred to by Article 35 (2) (a) of the Service Regulations annexed to the Radiotelegraph Convention, 1912; Provided, further, that only wave-lengths of 600 metres shall be used by the licensee during the period of any war in which the United Kingdom is engaged.

8. The licensed apparatus shall not be used by the licensee, or by any other person either on behalf or by permission of the licensee, for the transmission or receipt of messages except messages authorised by these regulations; and the licensee shall not, except with the consent in writing of the Minister of Telegraphs, send or receive messages from or at the licensed apparatus when in any harbour in the Dominion of New Zealand.

9. (1) The licensee shall not by the transmission of any message by means of the licensed apparatus or otherwise by the use of the licensed apparatus, interfere with naval signalling.

(2) If the Admiralty are of opinion that the working of the licensed apparatus at any ship station is inconsistent with the free use of naval signalling, the licensee shall, when required in writing by the Minister of Telegraphs so to do, close the said station.

(3) These provisions for the protection of naval signalling shall be construed to be without prejudice to the generality of any other provisions of the licence.

10. The licensee shall observe the International Telegraph Convention and International Telegraph Regulations so far as the said convention and regulations are capable of being applied to wireless telegraphy in common with ordinary land and submarine telegraphy.

11. The licensee shall observe the provisions of any regulations from time to time made under the provisions of the Post and Telegraph Act, 1908, and its amendments, by the Governor in Council or by the Minister of Telegraphs in relation to the conduct of wireless telegraph business, so far as the same are applicable to the licensee.

12. The licensee shall observe the provisions of the Radiotelegraph Convention, 1912.

13. The licensee shall comply with all such directions and observe all such rules as may be given or made by the Minister of Telegraphs from time to time for the purpose of preventing interference with the working of any other wireless telegraph station, and for enabling the messages exchanged by means of the licensed apparatus to be distinguished from those emanating from any other wireless telegraph station.

14. The licensed apparatus shall not, without the consent of the Minister of Telegraphs, be altered or modified in respect of any of the particulars referred to in the licence issued in respect thereof, and such apparatus shall at all times be maintained in good working order.

15. Except as provided in these regulations, the licensee shall transmit messages by means of the licensed apparatus on equal terms, without favour or preference, whether as regards rates of charge, order of transmission, or otherwise.

16. The licensee shall, so far as possible, receive from ships and light stations all requests for assistance and all signals of distress, and shall answer such requests and signals and retransmit them with the least possible delay, and with priority over all other messages, to the proper authorities by means of the licensed apparatus or by any other means in the power of the licensee.

17. The licensed apparatus at ship stations shall be worked only by a person or persons holding a certificate or certificates issued or recognised by the Minister of Telegraphs. Certificates shall be granted to persons of British nationality possessing the qualifications prescribed by the Radiotelegraph Convention, 1912, and shall be in such form and subject to such conditions, directions, or rules as the Minister of Telegraphs shall from time to time prescribe; and such certificates may at any time be withdrawn at the discretion of the Minister of Telegraphs in case of misconduct, or breach on the part of the holder of the Radiotelegraph Convention, 1912, or of any conditions, directions, or rules prescribed by the Minister of Telegraphs for the guidance of operators or for the working of such ship stations.

18. (1) The licensee, his servants and agents, shall not divulge the contents or the purport of the contents of any message, or make any use whatever of any message coming to his or their knowledge, other than to the addressee or his authorised agent, or to properly authorised officials of His Majesty's Government or of the Minister of Telegraphs, or to a competent legal tribunal.

(2) The licensee shall render to the Minister of Telegraphs such accounts as the Minister of Telegraphs shall direct in respect of all charges due or payable under the Radiotelegraph Convention, 1912, in respect of messages exchanged between the licensed ship stations and coast stations, and shall pay to the Minister of Telegraphs, at such times and in such manner as the Minister of Telegraphs shall direct, all sums which shall be due from the licensee under such accounts.

19. The licensee shall keep full accounts, records, and registers of all messages transmitted by means of the licensed apparatus; and in such registers each of such messages shall be accompanied by its identifying number and date, and full particulars of its place of origin and of ultimate destination, and such further particulars as the Minister of Telegraphs shall from time to time reasonably require to be shown. The licensee shall preserve all used message forms written and printed, and transcripts of messages, and all other papers for such period as is from time to time prescribed by the Radiotelegraph Convention 1912, and, in default of any provisions on the subject in the said convention, for such period as is from time to time prescribed by the International Telegraph Regulations; and such registers and message papers shall be open to the inspection of the Minister of Telegraphs or his authorised officers.

20. The Minister of Telegraphs, and any agent authorised in that behalf in writing by him, may at all reasonable times enter upon any licensed ship station for the purpose of inspecting, and may inspect, any apparatus fixed or being in such station for the purpose of sending and receiving messages by wireless telegraphy, and all other telegraphic instruments and apparatus fixed or being in such station, and the working and user of such apparatus and telegraphic instruments.

21. The licensee shall carry on every ship on which a ship station is established a print or copy of the licence, certified under the hand of an appropriate officer of the Minister of Telegraphs to be a true copy, and shall produce such print or copy for inspection if required to do so by the competent authorities of the countries where the ship calls, and also such documents as may be prescribed by the Minister of Telegraphs for the purpose of enabling the licensee to communicate with coast stations and ship stations, in accordance with the Radiotelegraph Convention, 1912.

22. (1) Every licence shall be in force from the date of the granting thereof until the 31st December of the year in which it is issued, and no longer; but may be renewed from year to year.

(2) The licensee shall pay to the Minister of Telegraphs for and in respect of the licence granted, and of every renewal thereof, a royalty of 5s. in respect of each ship station included in the licence.

(3) All royalties payable under any licence shall be payable on the date of the granting or renewal thereof, as the case may be.

23. Except with the consent in writing of the Minister of Telegraphs, the licensee shall not assign, underlet, or otherwise dispose of or admit any other person or body to participate in the benefit of any licence.

24. If and whenever an emergency shall have arisen in which it is expedient in the public interest that His Majesty's Government shall have control over the transmission of messages by the licensed apparatus, it shall be lawful for any officer of His Majesty's Navy or Army, or for any other person authorised in that behalf by the Admiralty, or by the Minister of Telegraphs, to take possession of or to cause the licensed apparatus or any part thereof to be taken possession of in the name and on behalf of His Majesty, and to be used for His Majesty's

service and subject thereto for such ordinary services as to the said officer or person may seem fit ; and in that event any person authorised by the said officer or person may enter upon any ship on which any such apparatus is installed and take possession of the said apparatus and use the same as aforesaid.

25. Any such officer or person may in such event as aforesaid, instead of taking possession of the licensed apparatus as aforesaid, direct and authorise such persons as he may think fit to assume the control of the transmission of messages by the licensed apparatus either wholly or partly and in such manner as he may direct, and such persons may enter upon any ship on which any apparatus is installed accordingly ; or the said officer or person may direct the licensee, his servants or agents, to submit to him, or any person authorised by him, all messages tendered for transmission or arriving by the licensed apparatus, or any class or classes of such messages, to stop or delay the transmission of any messages or deliver the same to him or his agent, and generally to obey all such directions with reference to the transmission of messages as the said officer or person may prescribe, and the licensee, his servants or agents, shall obey and conform to all such directions.

26. In any of the following cases, that is to say :—

(a) In case any sum of money which ought to be paid by the licensee to the Minister of Telegraphs under or by virtue of these regulations shall be in arrear and unpaid for one calendar month after the time at which the same ought to be paid under or by virtue of the provisions herein contained ; or

(b) In case of any breach, non-observance, or non-performance by or on the part of the licensee, his servants or agents, of any of the provisions (other than a provision for the payment of money) or conditions herein contained,—

then and in any such case the Minister of Telegraphs may, by notice in writing, revoke and determine the licence as to all or any of the ship stations thereby licensed, and thereupon the said licence shall absolutely cease, determine, and become void as to all or any of the said ship stations, as the case may be, but without prejudice to any right of action or remedy which shall have accrued to His Majesty under these regulations or otherwise.

27. Nothing in these regulations shall prejudice or affect the right of the Minister of Telegraphs from time to time to establish, extend, maintain, and work any system or systems of telegraphic communication (whether of a like nature to those licensed hereunder or otherwise) in such manner as he shall in his discretion think fit. Neither shall anything herein contained prejudice or affect the right of the Minister of Telegraphs from time to time to enter into agreements for or to grant licences relative to the working and use of telegraphs (whether of a like nature to those licensed hereunder or otherwise) or the transmission of messages in any part of New Zealand by means of wireless telegraphy, or by any other means, with or to any person or persons whomsoever, upon such terms as he shall in his discretion think fit. And (save as in these regulations expressly provided) nothing herein contained shall be deemed to authorise the licensee to exercise any of

the powers or authorities conferred on or acquired by the Minister of Telegraphs by or under the Post and Telegraph Act, 1908.

28. Any notice, request, or consent (whether required to be in writing or not) to be given by the Minister of Telegraphs under these regulations may be under the hand of the Secretary for the time being of the Post and Telegraph Department, and may be served by sending the same in a registered letter addressed to the licensee at the office or place of residence for the time being of the licensee, or, if such notice, request, or consent relates to any particular ship station, by delivery to the master of the ship upon which such station is installed; and any notice to be given by the licensee under these regulations may be served by sending the same in a registered letter addressed to the Secretary, General Post Office, Wellington.

29. All licences heretofore issued under the regulations hereby revoked shall continue in force, subject to the regulations under which they were issued, until the expiry of the current term thereof, but shall not be capable of renewal under the regulations so revoked.

SCHE

LICENCE FOR THE INSTALLATION AND WORKING OF APPARATUS FOR

Name of Ship on which Station established.	Class of Ship Station under the Radio- telegraph Convention, 1912.	Call- signal.	Nature of Services Performed.	Hours of Service.	Normal Range of Signalling in Nautical Miles.	
					By Night.	' By Day.
1.	2.	3.	4.	5.	6.	7.

REGULATIONS

AS TO SHIPS BEING PROVIDED WITH WIRELESS TELEGRAPHY APPARATUS.

ORDER IN COUNCIL.

E At the Government House, at Wellington, this twentieth day of October, 1913.

Whereas it is enacted by Section 50 of the Shipping and Seamen Amendment Act, 1909, that the Governor may from time to time by Order in Council make regulations requiring ships registered in New Zealand, and carrying passengers, to be provided with apparatus for transmitting messages by means of wireless telegraphy, and may by such regulations prescribe fines not exceeding fifty pounds for any breach thereof by the owner or master of a ship. And whereas it is desirable to make such regulations :

Now, therefore, His Excellency the Governor of the Dominion of New Zealand, in exercise of the hereinbefore recited power and authority, and acting by and with the advice and consent of the Executive Council of the said Dominion, doth hereby make the following regulations, and doth hereby order that they shall come into force on July 1st, 1914 :

Provided that, if in his opinion the circumstances justify it, the Minister of Marine may exempt any steamship from the operation of these regulations, and may limit the time for which any such exemption shall be in force.

REGULATIONS.

1. Every steamship registered in New Zealand, and carrying passengers, which is engaged in the foreign or inter-colonial trade, except steamships trading to the Chatham, Auckland, Campbell, and Antipodes Islands, and every home trade steamship which is authorised by her ordinary survey certificate to carry not less than 150 passengers at sea, shall not leave or attempt to leave any port in New Zealand unless such steamship is equipped with an efficient apparatus for radio

DULE.

WIRELESS TELEGRAPHY ON BOARD SHIPS OWNED BY

Character of Apparatus.		Power.		
System of Radiotelegraphy with the Characteristics of the System of Emission.	Wave Lengths (in Metres).	Source and Maximum Output.	Maximum to be normally taken by Sending Instruments.	If Alternator is used, Number of Cycles per Second.
8.	9.	10.	11.	12.

communication in good working order, to be operated by a person skilled in the use of such apparatus, which apparatus shall be capable of transmitting and receiving messages over a distance of at least one hundred miles, day or night.

2. Ships required by these regulations to carry the apparatus prescribed above shall be placed in the third class as defined by Article XIII. of the Detailed Service Regulations, appended to the International Radiotelegraph Convention, 1912—that is, they are not bound to perform any regular listening service.

3. The Minister of Marine may appoint inspectors for the purposes of these regulations, and such inspectors and superintendents of Mercantile Marine may visit any steamship required by these regulations to be equipped with apparatus for radio communication before they leave port, and ascertain if they are equipped with such apparatus the

operation of which shall be carried out by a telegraphist holding a certificate as prescribed by Article X. of the Detailed Service Regulations attached to the International Radiotelegraphic Convention.

4. Where a passenger steamship subject to these regulations is without the apparatus and the operator prescribed, and is about to attempt to leave port, an inspector or superintendent shall :—

(a) Notify the master of the fine to which he will be liable, and of the particulars in respect of which the law has not been complied with ;

(b) Notify at once the Collector of Customs, who may thereupon withhold the vessel's clearance until the requirements of these regulations are complied with ;

(c) Prepare a report in writing of his action and transmit it to the Collector of Customs, who shall forward a copy to the Secretary of the Marine Department.

5. An inspector or superintendent may, at any time before a vessel subject to these regulations leaves port, require the master to give him a certificate, in the form set forth in the appendix hereto, that the wireless apparatus of his ship is sufficient and in good working order, and the master shall give such certificate before the vessel leaves port.

6. The power necessary to transmit signals shall at all times, while the vessel is under way, be available for the wireless operator's use.

7. Subject to the above regulations, the installation and operation of the apparatus required by them to be fitted shall be in conformity with the requirements of the Post and Telegraph Act, 1908, and its amendments, and the regulations made thereunder.

8. Any master or owner of a steamship committing a breach of these regulations is liable to a fine not exceeding £50.

APPENDIX.

This is to certify that the wireless operator in principal charge of the apparatus for radio communication on the s.s. " " has this day certified to me in writing that the said apparatus is efficient and in good working order.

(Signed)

Master.

NICARAGUA

THIS Central American State lies between Costa Rica on the south and Honduras on the north. Its area is estimated at 49,200 square miles, and it possesses a coast line of about 300 miles on the Atlantic, whilst that on the Pacific Ocean stretches for about 200 miles.

The present constitution came into force on April 5th, 1913. It vests the executive functions in a President, and the legislative power in a Congress of two houses. On February 18th, 1916, a treaty between Nicaragua and the United States was ratified, which laid down the conditions for the acquisition by the latter of naval bases on the Pacific and Atlantic coasts, and of the projected canal route.

With regard to wireless telegraphy, none of the installations at present existing in Nicaragua are owned by the Government. The United States Government possess a station in Managua, the capital of the Republic, and there are two stations owned by private companies on the Atlantic Coast. These stations (with the exception of that owned by the American Government) have been erected under contract with the Government of the Republic, and are subject to the provisions of the London Radiotelegraphic Convention of 1912.

The control of any stations which the Government might establish on its own account would be vested in the Minister of Progress and Public Works (*Ministerio de Fomento*) and the Postmaster-General. No special legislation bearing on the subject has, however, been promulgated in the country. The above-mentioned convention constitutes the only law at present applicable to Nicaragua in the case of wireless telegraphy.

NIGERIA

THIS territory comprises a number of areas formerly under separate administrations. The greater part consists of the country formerly under the rule of the Royal Niger Company, which obtained a Charter in 1886 and surrendered it to the Crown in 1899.

Nigeria, therefore, on January 1st, 1914, had its boundaries defined afresh, and is divided into (a) Northern and (b) Southern Nigeria.

Wireless Telegraphy is regulated separately in these two divisions, and we append hereto the Rules and Regulations at present in force.

(a) NIGERIA (NORTHERN).

The following Proclamation providing for the control by the Governor of electrical communication by Wireless Telegraphy was issued in 1904 :—

1. This Proclamation may be cited as the Wireless Telegraphy Proclamation.

2. No person shall import, keep, use or establish any apparatus or installation for transmission of messages by wireless telegraphy without previously obtaining from the Governor a licence setting forth the terms and conditions upon which the same is granted.

3. Any person infringing this Proclamation shall be liable upon conviction in addition to confiscation of every such apparatus and installation to a penalty not exceeding £500 or in default to imprisonment for a term not exceeding twelve months or to both.

4. It shall be lawful for the Governor from time to time by Proclamation to prescribe the terms and conditions upon which, if at all, such licence is granted.

(b) NIGERIA (SOUTHERN).

A—Wireless Telegraphy Ordinance, 1913.

B—Regulations

A 1. This Ordinance may be cited as the Wireless Telegraphy Ordinance, 1913.

2. In this Ordinance, the following words and expressions shall have the meanings hereby assigned to them unless there is something in the subject or context repugnant to such constructions :—

“Wireless telegraphy” means any system of communication by telegraph without the aid of any wire connecting the points from and at which the messages or other communications are sent or received.

“Colony” includes Protectorate.

3. (1) A person shall not establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place in the Colony except under and in accordance with a licence granted in that behalf by the Governor.

(2) Every such licence shall be in such form and for such period as the Governor may determine, and shall contain the terms, conditions and restrictions on and subject to which it is granted.

4. A person shall not work any apparatus for wireless telegraphy installed on any merchant ship, whether British or foreign, while that ship is in the territorial waters of the Colony, otherwise than in accordance with regulations made under this Ordinance.

5. (1) The Governor may make regulations for carrying into effect the purposes of this Ordinance.

(2) The regulations in the Schedule to this Ordinance shall have effect except in so far as they may be amended or revoked by regulations made under the authority of this section.

(3) If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the territorial waters of the Colony shall be subject to such further regulations as may be made by the Governor, and such regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

6. If a District Commissioner is satisfied by information on oath that there is reasonable ground for suspecting that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship without a licence in that behalf or contrary to the provisions of any regulations made under this Ordinance or of any licence granted under this Ordinance, he may grant a search warrant to any police officer or any person appointed in that behalf by the Inspector-General of Police and named in the warrant, and a warrant so granted shall authorise the police officer or person named therein to enter and inspect the station, place or ship and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

7. Any person who shall offend against any provision of this Ordinance or any of the regulations made thereunder shall be liable on conviction before a District Commissioner, anything in the Supreme Court Ordinance to the contrary notwithstanding, to a fine not exceeding fifty pounds, and upon such conviction the Court may order that any apparatus for wireless telegraphy in connection with which the offence was committed shall be seized and forfeited.

8. Nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than that of wireless telegraphy.

9. The Wireless Telegraphy Ordinance and the Wireless Telegraphy (Amendment) Ordinance, 1912 [THE YEAR-BOOK OF WIRELESS TELEGRAPHY AND TELEPHONY, 1913, p. 183], are hereby repealed.

SCHEDULE. SECTION 5 (2).

REGULATIONS.

B (I.) All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the Colony shall be worked in such a way as not to interfere with—

(a) Naval signalling, or

(b) The working of any wireless telegraph station lawfully established, installed or worked in the Colony or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

(II.) In these Regulations “Naval signalling” means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty’s Navy, between ships of His Majesty’s Navy and Naval Stations, or between a ship of His Majesty’s Navy or a Naval Station and any other wireless telegraph station whether on shore or on any ship.

(III.) No apparatus for wireless telegraphy on board a merchant ship shall be worked or used while such ship is in any harbour or bay of the Colony except with the special or general permission of the Governor.

(IV.) For the purpose of any proceedings under these regulations the master or person being or appearing to be in command or charge of any ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.

(V.) Any summons or other document in any proceedings under these regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in command or charge of the ship.

(VI.) These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

NORWAY

THE most westerly of Scandinavian nations emerged from the obscurities of myth and legend in the ninth century, and, after a vigorous separate national existence, was united with Sweden and Denmark under Queen Margaret by the Union of Kalmar in 1397. In 1814 Norway separated from Denmark, and Charles XIII. of Sweden established his rule over the two countries.

This co-partnership endured until the peaceful revolution of 1905 restored to the Norwegians their complete independence.

Norway covers an area of 124,130 square miles, and is ruled by a king with the co-operation of the Norwegian Parliament, which bears the historic title of "Stor-thing." Its capital is Christiania, picturesquely situated on a Fjord, which owes its patronymic to the city.

Radiotelegraphy is organised under the supervision of the Telegraph Department; whilst for Naval and Military purposes the War Office and Admiralty exercise jurisdiction over their own wireless section.

The first wireless stations to be erected and opened for public correspondence were those at Sörvaagen and Röst, both completed in 1906. Radiotelegraphic communication was established in 1911 between Norway and Arctic Spitzbergen, and has been maintained ever since. The important Transatlantic long distance station of Stavanger is nearing completion, whilst at Christiania another high-power installation is in course of erection for communication with England and Russia.

The latest available statistics enumerate :

- 8 coast stations opened for public correspondence,
- 1 instructional station, and
- 75 installations on Russian ships.

There are at present no wireless clubs or societies.

PUBLIC DEPARTMENTS CONTROLLING WIRELESS OPERATIONS.

Official.	Title.	Address.
Colonel T. Heftye ...	Telegraph Department: Director-General of Telegraphs	Christiania
H. Petersen... ..	Radio Engineer	Christiania (Telegraph Department)
B. Gottwaldt ...	Wireless Department of the Navy: Captain, R.N.	Horten (Navy Yard)

The Laws and Regulations under which wireless is administered in this country appear in the following pages in accordance with the list appended hereto.

A—Law of 24th July, 1914.

B—Law of 18th August, 1914.

C—Regulations.

D—Ship Licence.

E—Notice to Mariners.

F—Royal Proclamation Prohibiting Wireless in Territorial Waters, dated 2nd June, 1917.

LAW OF JULY, 1914.

A Law of July 24th, 1914, supplementing and amending the Law of April 29th, 1899, relating to the forwarding of communications by aid of telegraphic conductors or such like installations and relating to the repeal of Law No. 2 of July 16th, 1907 :—

Section 1.—On ships which sail under the Norwegian flag and which do not belong to the Norwegian Navy, stations or installations for telegraphing or telephoning by wireless both within and without the boundaries of the Kingdom may only be installed and worked after

an authorisation obtained in advance, which will be granted by the King, or whoever may be authorised thereto, on certain definite conditions for a stipulated period of time. The permission may at any time be withdrawn if the conditions imposed are not adhered to.

Detailed Rules and Regulations relating to the fitting up and working of such stations or installations shall be drawn up by the King.

On ships which sail under a foreign flag and are within Norwegian territorial waters wireless telegraphing and telephoning can only be carried on—even if they have permission for same from the authorities of the foreign country—subject to observance of the provisions which are made with respect thereto by the King or whomsoever he may have authorised for the purpose, who may, moreover, forbid all telegraphing or telephoning from such ships, whenever circumstances may be considered to require it.

Section 2.—The exceptions mentioned in the Law of April 29th, 1899, under Section 1, 2nd paragraph, relating to the working of plant which may be used by a commune or private person for his own use, or such as railways may install for their own working, shall not apply so far as the working of installations for wireless telegraphy or telephony are concerned.

Section 3.—Any infractions of the aforementioned conditions shall be punished pursuant to the provisions laid down in the Law of April 29th, 1899, Section 6.

Moreover, any transgression of the rules or provisions which are drawn up with regard to Section 1 of the present Law shall be punished by fines.

Section 4.—This Law shall come into force immediately. The Law of July 16th, 1907, containing additions and amendments to the Law of April 29th, 1899, relating to the forwarding of communications by means of telegraph lines or similar installations, is hereby repealed.

LAW OF AUGUST, 1914.

B The following paragraph, taken from the “Law of August 18th, 1914,” amending the Law of April 29th, 1899, relates directly to Wireless Telegraphy :—

Within the boundaries of Norway, or its territorial waters, stations and installations for wireless telegraphy and telephony may only be erected or worked after permission has been obtained from the King or whomever he may authorise thereto, and on such conditions as are laid down in the said permission.

REGULATIONS.

C The following regulations are based on the Law of July 24th, 1914 :—

1. No radiotelegraphic station on board a foreign vessel within the limits of Norwegian territorial waters can be used without a special licence.

Application for such licence must be made to the Ministry of Telegraphs, which Ministry, after consultation with the Ministry of Marine, will decide on the application.

2. The licence granting the right to use wireless telegraphic stations within the radius of Norwegian territorial waters may be limited to definite places and to fixed hours of the day.

Wireless transmission of messages must be stopped immediately on the order of the Ministry of Telegraphs, Ministry of Marine, or of any coast station established by the aforesaid Ministries.

3. If the vessel is in a Norwegian port situated within a radius of 5 kilometres from the nearest telegraph station, the station on board the vessel cannot communicate either with Norwegian coast stations or with foreign coast stations.

Without a special licence, a wireless station on board a vessel in a Norwegian port cannot be used for the exchange of messages with other ship stations, unless for the purpose of advising accidents.

4. However, the preceding provisions do not apply to foreign ships of war, as far as the interchange of messages between themselves is concerned.

It is the duty, nevertheless, of stations on board foreign warships to conform to the provisions in Article 2, Paragraph 2, above.

5. If a station is used when a ship is in Norwegian territorial waters this station must conform to the provisions of the International Telegraphic Convention and the regulations appended thereto.

D NORWEGIAN LICENCE CONDITIONS

Conditions for erection and working of Radiotelegraph and Radiotelephone stations on board ships (ship-stations).

FORM OF LICENCE.

According to the Law of 16th July, 1907, and the Royal Decree of the 30th August, 1913, permission is hereby given to.....

.....to erect and work on board the ship.....

a Radiotelegraph Station (Radiotelephone Station) in accordance with the Table of Particulars on the last page of this form. The permission is valid from.....to..... and is given on the following conditions.

1. The station shall belong to theclass of stations as specified in the International Radiotelegraph Convention Service Regulations, Art. XIII b, and will thus have..... service.

2. The installation shall be effected in every respect in accordance with the installation plan approved by the Telegraph Department, and must not be departed from without the agreement of the said department. Ships belonging to the 1st and 2nd classes must be provided with emergency Radiotelegraph installations, as laid down in the existing Radiotelegraphic Service Regulations.

3. The holder of the licence shall as far as the erection and working of the station is concerned, be under the obligation in every respect to adhere to existing international agreements with annexed regulations concerning Radiotelegraphy and Telephony when such International Agreements have been adhered to by Norway, and further he shall abide by such regulations as may be issued by the Department for Public Works or by the Telegraph Department.

4. The Telegraph Department shall have the right, in the interests of the service and (after conferring with the Naval Department) to require any alterations to be made in the wave lengths employed as given in the above-mentioned Table of Particulars within the limits laid down in the regulations, either as a temporary or permanent measure in the working of the station.

5. The holder of the licence shall recognise the importance of keeping the station in the best possible condition in order to ensure good working.

6. The station shall be under the obligation to forward telegrams to and from persons on board, with due regard to existing general rules for such work. Further, the station shall be obliged to communicate with other ship or coast stations without regard to the system of apparatus employed at those stations.

7. The answering of signals from ships in distress and the correspondence caused thereby shall have priority over all other correspondence.

8. During the ship's stay in a Norwegian Port the station must not be used for communication either with Norwegian or with Foreign coast stations. Neither shall the station, while the ship is in a Norwegian port, be used for communication with other ship stations without special permission, or unless such communication is effected with a view to prevent accidents. Special permission is granted by the Telegraph Department after conferring with the Naval Department.

9. The call signal of the station is.....

10. The tax due to the ship station is.....(ore)
(.....centimes) per word with a minimum of.....(ore)
(.....centimes) per message.

11. The service on board must be performed by one telegraphist, or, for ship stations of Class I, by two or more telegraphists holding a certificate issued by the Telegraph Department.

This certificate states that the telegraphist concerned possesses the knowledge and abilities as prescribed in the existing International Regulations.

The granting of such certificate depends upon the passing of an examination arranged by the Telegraph Department. Petty Officers and Seamen belonging to the Navy's staff of mechanics, and who are specially trained as Radiotelegraphists for the Navy, are entitled to such certificate when they can prove to the Telegraph Department that they have the necessary knowledge of the handling of telegrams and when they procure from the authority concerned in the Navy, a testimonial to the effect that they satisfy the International Regulations as far as their knowledge of the instruments, ability, etc., is concerned. Without the permission of the Telegraph Department other than Norwegian subjects must not be employed for the service on board.

The holder of the licence will take the best possible care that the contents of messages do not come to the knowledge of unauthorised persons.

The telegraphist will make the usual promise of secrecy.

12. The holder of the licence is responsible for the charges that are due for the transmission of the messages sent from the ship station, including the charge for the coast station.

The Telegraph Administration, on its side, pays to the holder of the licence the charges that are due to the ship station for the messages addressed to the ship. "Journals" (abstracts) should be kept in respect of the correspondence (traffic). These "Journals," together with the originals of the transmitted messages and such other documents as may be required, are to be sent to the Telegraph Department, as far as possible, at the end of each month.

The mutual settlement of the charges will take place quarterly or monthly, as may be arranged between the Telegraph Department and the holder of the licence. However, with the agreement of the Telegraph Department the holder of the licence may make other arrangements for the accounting of stations on ships that are exclusively engaged in Foreign Waters. Such arrangements may be made with the Administrations to which the coast stations that the ships usually make use of belong. Similarly, the Telegraph Department may make arrangements other than those mentioned above with Foreign Administrations.

13. The station is subject to such supervision as may be decided by the Department for Public Works, and one or more of the Officials appointed by the Department for Public Works or by the Telegraph Department should be given opportunity to inspect the station.

For the supervision of the station the holder of the licence has to pay a certain fee that will be decided by the Department.

14. When State or other public reasons so demand it, the Department for Public Works or the Naval Department may partly or entirely prohibit the transmission of any kind of traffic correspondence at the station without admitting any claim for compensation. Likewise, in the interests of the service, the Telegraph or Naval Department can prohibit with the same effect all correspondence from the station, either at certain places or at certain times of the day.

15. The Norwegian State has the right to take over the station with six months' notice against compensation, the amount of which will be fixed after valuation should it not be possible to arrive at an amicable adjustment.

The valuation will be made by a Committee of three members, whereof one member is nominated by the owner, one by the Telegraph Department and one by the Department of Public Works.

The member nominated by the Department for Public Works will be the Chairman of the Committee.

The questions put before the Committee will be decided solely by majority of votes.

In case the owner has not, within thirty days after the reception of the invitation, made any such nomination as mentioned above, or in case the member nominated by him fails to attend, the valuation will then with obligatory effect be decided by the other nominees.

In case of equal voting the vote of the Chairman shall decide the matter.

In the valuation regard shall only be paid to the technical value of the station at the moment of valuation, the income, etc., derived from the station not being taken into account.

The valuation shall take place within a time-limit fixed by the Telegraph Department and will be at the public expense.

16. The licence shall become null and void in case :—

(a) Use is not made of it within a year of its issue.

(b) Breach is made of any of its regulations.

(c) The ship ceases to fly the Norwegian flag.

17. Disputes as to the intent and meaning of this licence shall, with obligatory effect, be decided by the King.

The Telegraph Department,

CHRISTIANIA.....19

.....

SCHEDULE.

System.	Type of Installation.	Normal range (by day)	Wave-lengths (the normal wave to be underlined).	Description of Transmitting and Receiving Instruments. (Detailed sketch of connections attached.)	Type of Aerial. (Sketch with measurements attached.)	Description of Emergency Gear (for ship stations of 1st and 2nd classes. Detailed sketch of connections attached.)	Remarks.

NOTICE TO MARINERS.

E The State Telegraph Department issued in December, 1908, the following "Notice to Mariners" applying to wireless telegraph equipments on board ships in Norwegian territorial waters :—

1. Wireless telegraph or wireless telephone stations on board foreign vessels must not be operated, except by special permission, within Norwegian territorial waters. Requests for such permission must be sent to the Telegraph Department, which will communicate its decision after conference with the Marine Department.

2. Permission to operate the stations on board foreign vessels within Norwegian territorial boundaries may be restricted to certain fixed places, or to certain fixed periods of the 24 hours. Correspondence by means of the wireless apparatus shall be at once suspended whenever it shall be so desired by the Telegraph Department, the Marine Department, or by any one of the coast stations under their authority.

3. During the stay of a vessel in a Norwegian harbour, within a distance of 5 kilometres (2 $\frac{1}{10}$ ths miles) from the nearest telegraph station, the station on board a foreign vessel must not be employed for telegraphing either with Norwegian or foreign coast stations. Without special permission, the station during a vessel's stay in a Norwegian harbour must not be employed for communicating with other ship stations except for the purpose of preventing accidents.

4. The regulations above mentioned do not, however, apply to stations on board vessels of war belonging to foreign powers, which carry on mutual correspondence. Such stations are, however, bound to submit themselves to the regulations contained in the second clause of Section 2.

5. Whenever the station on board a foreign vessel is employed during her stay in Norwegian territorial waters, this shall be done subject to the regulations contained in the International Telegraph Convention, with the rules pertaining thereto.

PROHIBITION AGAINST THE USE OF WIRELESS TELEGRAPH IN NORWEGIAN TERRITORIAL WATERS.

Pursuant to Act of July 24th, 1914, the following is ordained :—

F 1. All use of wireless telegraph from ships of belligerent powers is forbidden in Norwegian ports, the whole area of the naval ports included. Such ships as mentioned are therefore during their stay in such ports to have their aerials (antenna) lowered and, if required by the authorities, to have their wireless stations sealed.

2. In Norwegian territorial waters the use of wireless telegraph from ships of belligerent powers is likewise generally forbidden. Merchant vessels of belligerent powers shall therefore, while trafficking in Norwegian territorial waters, have their aerials (antenna) lowered and, if required by the authorities, have their wireless stations sealed.

3. In Norwegian ports, the whole area of the naval ports included all use of wireless telegraph from Norwegian merchant vessels and foreign merchant vessels of non-belligerent powers is forbidden, unless it be done in order to prevent disasters. The authorities may, if it be considered desirable, also subject such ships to further restrictions, require their aerials (antenna) lowered and their wireless stations sealed.

Order to control that these provisions are observed by all concerned is issued to Norwegian warships, naval and military authorities, pilotage, customs, harbour and police authorities, as well as by pilots serving on board of such vessels as above mentioned.

Infringements are liable to punishment.

K. FR. DAWES,

Admiral Commander-in-Chief,

K. OSTBYE.

Kristiania, June 2nd, 1917.

NYASALAND PROTECTORATE

THIS Colony was constituted on May 14th, 1891, as the "British Central Africa" Protectorate, and so remained until 1907, when it assumed its present appellation. Its area covers 39,573 square miles, the trade ports being Port Herald, Chiromé (Lower-Shiré), Kota-Kota, Karonga, and Fort-Johnston (Lake Nyasa). Communication is maintained by river steamer with the port of Chinde on the Zambesi.

It is administered (under the Colonial Office) by the Governor and Commander in Chief, assisted by an Executive and an Administrative Council.

There is a telegraph line through the Protectorate to Tanganyika and Ujiji and so on to Capetown.

Wireless Telegraphy is regulated under the following Act:—

WIRELESS ORDINANCE, 1908.

1. This Ordinance may be cited as "The Wireless Telegraphy Ordinance," 1908.

2. No person shall establish or use any apparatus or installation for the purpose of operating wireless telegraphs without a licence from the Governor.

Any person contravening this section shall be liable on conviction to a fine not exceeding £100 or to imprisonment with or without hard labour for a term not exceeding twelve months with or without the option of a fine, and in addition any apparatus or installations in respect of which an offence under this section is committed may be forfeited and sold or disposed of as the Governor may direct.

3. The Governor in Council may from time to time make, and when made shall publish in the *Gazette*, rules prescribing the terms and conditions upon which licences to establish or use apparatus or installations for the purpose of operating wireless telegraphs may be granted, and may impose a penalty on conviction for breach of any rules so made of a fine not exceeding £50 or imprisonment with or without hard labour for a term not exceeding six months with or without the option of a fine, and such Rules may further provide for forfeiture and sale or disposal as the Governor may direct of any such apparatus or installations as aforesaid.

PACIFIC ISLANDS

BEFORE the start of the present war the islands in the Pacific were divided with regard to European supervision between Germany, France, and Great Britain. The former has disappeared as completely from the Pacific as from all extra European waters. It is not possible to include particulars concerning the French spheres of influence, and we therefore for the present confine ourselves to the British.

The High Commissioner of the Western Pacific (assisted by deputies) exercises jurisdiction, in accordance with an Order in Council of 1893, for the purpose of carrying out the provisions of the Pacific Islanders' Protection Acts of 1872 and 1875, and to settle disputes between British subjects living in these islands. The authority of the High Commissioner extends over all the Western Pacific not within the limits of Fiji, New Zealand, Queensland, or New South Wales, or the jurisdiction of any civilised power, and includes the Southern Solomon Islands and the various small groups in Melanesia.

The New Hebrides are ruled under the joint administration of British and French officials in accordance with the Anglo-French Convention of 1906. The *Wireless Regulations* current there figure below.

The principal groups consist of the British Solomon Islands, the Gilbert and Ellice Islands, the Tonga or Friendly Islands, the Phoenix Islands, Pitcairn Islands, and the New Hebrides (*vide supra*).

Of these only Fanning Island (which under an Order in Council of 27th January, 1916, was included in the Gilbert and Ellice Colony) is connected by cable with the rest of the world.

With regard to the other islands the only telegraphic communication is by means of wireless, and were are able to print below the *Wireless Regulations in force* in the Gilbert and Ellice Colony, wherein the centre of administration (at Ocean Island) is able to exchange official and public correspondence with Nauru, Tulagi and Apia.

GILBERT AND ELLICE COLONY.

This group comprises 31 islands, with a number of small islets depending upon them, and lies between latitude 4° N. and 10° S.; its longitude being 169° E. to 158° W. The total area approximates to 200 square miles. Out of a population of about 32,000, four hundred are Europeans, and three hundred and fifty Asiatics, the remainder being Polynesians and Micronesians.

The Government Headquarters are located at Paanopa, Ocean Island, which is also the scene of important operations by the Pacific Phosphate Company. The following are the rules and regulations at present in force :

A—King's Regulation No. IX. of 1912.

B—Rules under the provisions thereof.

[COPY.]

KING'S REGULATION NO. IX. OF 1912.

TO GOVERN THE USE OF WIRELESS TELEGRAPHY IN THE WESTERN PACIFIC.

A 1. This regulation may be cited as "The Wireless Telegraphy Regulation, 1912."

2. The Wireless Telegraphy Regulation, 1907, is hereby repealed.

3. (1) It shall not be lawful for any person to establish, install or use any apparatus for the purpose of electrical communication by means of wireless telegraphy in any protectorates, islands or places within the jurisdiction of the High Commissioner for the Western Pacific specified in the schedule hereto without a licence to do so first obtained from the said High Commissioner.

(2) A licence under this section shall be subject to such terms and conditions as may be prescribed by any rules made under this regulation and to such other terms and conditions as the High Commissioner may from time to time prescribe.

4. The High Commissioner may make rules from time to time to carry out the provisions of this Regulation and in particular to regulate the use of apparatus for wireless telegraphy on board merchant ships, whether British or foreign vessels, while in the territorial waters of the protectorates or islands or places aforesaid.

5. Any person who contravenes the provisions of this Regulation or of any rules made hereunder, or fails to observe and perform the terms and conditions of a licence granted by the High Commissioner hereunder or prescribed by any rules aforesaid, shall be liable to a penalty not exceeding one hundred pounds and to the forfeiture of any apparatus established, installed or used for the purpose aforementioned.

6. This Regulation shall not apply to the islands of the Pacific Ocean known as the New Hebrides, including the Banks Islands and Torres Islands.

SCHEDULE.

The British Solomon Islands Protectorate, The Gilbert and Ellice Islands Protectorate, The Union (Tokelau) Islands, The Phoenix Islands, Fanning Island, Washington Island, Christmas Island and all other islands in the Western Pacific not being within the jurisdiction of the Commonwealth of Australia or any of the states thereof or of the Dominion of New Zealand or of any civilised Power.

B RULES TO REGULATE THE USE OF WIRELESS TELEGRAPH APPARATUS ON MERCHANT SHIPS IN THE WESTERN PACIFIC MADE BY THE HIGH COMMISSIONER UNDER THE PROVISIONS OF THE WIRELESS TELEGRAPHY REGULATION, 1912.

1. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the protectorates, islands and places specified in the schedule to the Wireless Telegraph Regulation, 1912, shall be worked in such a way as not to interfere with (a) naval signalling; and (b) the working of any wireless telegraph station lawfully established installed or worked in those protectorates, islands or places or the territorial waters thereof; and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used while that ship is in any of the harbours of the protectorates, islands and places aforesaid except with the special or general permission of the Resident Commissioner or other Chief Executive Authority therein.

3. If at any time in the opinion of the High Commissioner an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the territorial waters aforesaid shall be subject to such further rules as may be made by the High Commissioner from time to time, and those rules may prohibit or regulate that use in all cases or in such cases as may be deemed desirable.

4. These rules shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

NEW HEBRIDES.

THIS archipelago consists of a number of islands of varying size, administered jointly by British and French officials, in accordance with the Anglo-French Convention of 1906. Within the islands Great Britain is represented by a Resident Commissioner, who reports to the High Commissioner for the Western Pacific. The British Local Commissioner resides at Vila.

With regard to wireless telegraphy joint regulations have been issued by the Condominium Administration, the text of which will be found below.

A—Regulation dated 1909.

B—Wireless Telegraph (Ships) Regulation, 1916.

A JOINT REGULATION TO REGULATE THE INSTALLATION OF
WIRELESS TELEGRAPHY IN THE NEW HEBRIDES.

1. From the date of the passing of this Regulation it shall be **A** unlawful for any person to use or establish in any of the islands of the New Hebrides including the Banks and Torres Islands any apparatus or installation for the purpose of electrical communication by wireless telegraphy without a licence first obtained from the Resident Commissioners conjointly such licence to be granted on such terms and conditions as the Resident Commissioners aforesaid may from time to time determine.

2. Any person offending against the provisions of the preceding section or failing to comply with the terms and conditions of a licence when granted by the Resident Commissioners under the provisions of this Regulation shall be liable to a penalty not exceeding Twenty Pounds and to forfeit any apparatus used or established for the purpose aforementioned.

3. Offences against this Regulation shall be justiciable by the Joint Court contemplated by the Tenth Article of the Anglo-French Convention of the twentieth day of October one thousand nine hundred and six and pending the establishment of such Court by the Court of the nation to which or to whose legal system the accused may belong.

4. This Regulation may be cited as "The Wireless Telegraphy Regulation, 1909."

Published and Exhibited at the Public Offices of the Resident Commissioners for His Britannic Majesty and for the French Republic this seventh day of January in the year one thousand nine hundred and nine.

A JOINT REGULATION TO CONTROL THE USE OF WIRELESS TELEGRAPH
APPARATUS ON MERCHANT VESSELS IN THE NEW HEBRIDES.

1. From the date of the passing of this Regulation all **B** apparatus for wireless telegraphy on board merchant ships in the territorial waters of the New Hebrides shall be worked in such a way as not to interfere with :—

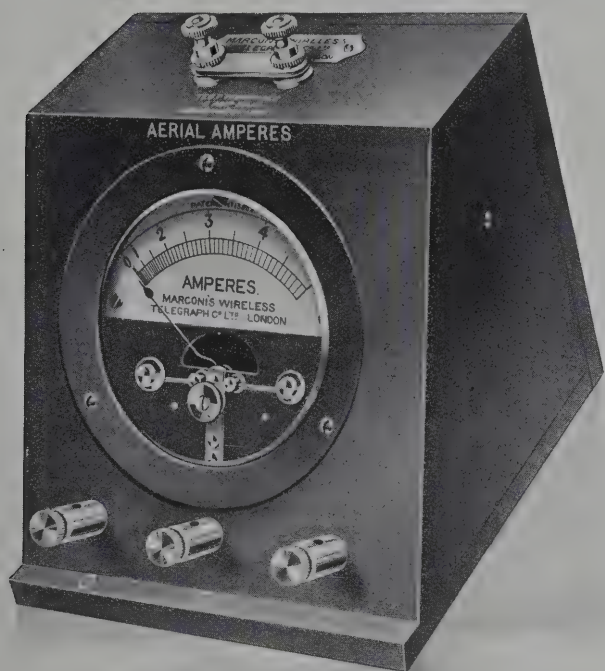
(a) Naval signalling ;

(b) The working of any wireless telegraph station lawfully established installed or worked in the New Hebrides or the territorial waters thereof ; and

(c) The transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. No apparatus for wireless telegraph on board a merchant ship shall be worked or used while the ship is in any of the harbours of the New Hebrides except with the joint special or general permission of the Resident Commissioners.

3. The Resident Commissioners shall have power to issue such further rules as to them may seem expedient for the control of wireless telegraphy on merchant vessels and for the censorship of messages transmitted from such vessels while in the territorial waters of the Group.



DOUBLE-RANGE TRANSFORMER TYPE OF HOT-WIRE AMMETER.

[To face page 420.]

4. Any infraction of this Regulation shall be punishable by the Joint Court with a money penalty of from one to twenty pounds and imprisonment for one day to one month or with one or other of these penalties.

5. This Regulation may be cited as the "Wireless Telegraph (Ships) Regulation 1916."

Published and exhibited in the Public Offices of the Resident Commissioners for Great Britain and the French Republic, at Vila, in the New Hebrides, this 30th day of October, 1916.

PANAMA (CANAL ZONE)

THE idea of a Canal through the Isthmus of Panama originated with a Spanish engineer in 1530. Monsieur de Lesseps laboured on its construction from 1882 to 1904, when the United States Government took over the undertaking. This action of the U.S.A., followed closely on the establishment of a separate Republic of Panama (a secession from the U.S. of Colombia), which took place on November 23rd, 1903. The American Canal was opened for traffic on August 15th, 1914.

The American controlled zone consists of a strip of land 10 miles in width, extending across the Isthmus a distance of 50 miles. The rights of sovereignty are vested in the U.S.A. under a treaty signed on February 26th, 1904.

The Zone is ruled by a Governor, who reports through the Secretary of War to the President and conducts the government according to the authority invested in him by Acts of Congress and Executive Orders. In periods of crisis or times of war the supreme command is vested in the Commanding Officer of the Troops, designated as the Panama Canal Department of the U.S.A. Army. Radiotelegraphy in the Zone is administered by the Navy Department of the United States, who detach a naval officer designated as radio officer for the purpose of its supervision.

The first radio station erected was situated in the Republic of Panama, within the Municipal limits of the City of Colon in 1906, and the reservation there established is still the site of a successor to this pioneer station.

Under agreement between the Republic of Panama and the United States of America Radiotelegraphic Communication within the Republic, as well as in the Canal Zone, remains under the control of the U.S.A. This arrangement rests on Decree No. 130 of August 29th, 1914, signed by the President of the Panama Republic.

The small station, established at Porto Bello, Panama, in 1909, was closed on May 13th, 1914. The Colon station, established on March 1st, 1910, was re-equipped with improved apparatus, and opened to commercial traffic in January, 1913. At Balboa (Pacific end of the Canal) there stands a station opened for commercial business in June, 1913, and replaced by an improved installation on the same site in 1914. The well-known "Darien" station (located alongside the Canal, midway between the oceans) is a high-power installation designed primarily for communication with Washington and for naval vessels at sea. It possesses a sending radius of 3,000 miles and was placed in regular service on April 5th, 1915.

There are no wireless clubs or radio societies, the whole of the wireless operations being controlled and administered by the U.S. Navy.

The "Darien" station sends out time and weather signals daily (see under "Time and Weather Signals" Section of the YEAR BOOK). The radio stations at Colon and Balboa send broadcast at 4 a.m., at noon, at 4 p.m., and 8 p.m. any notices to mariners which may be supplied by the port captains for the respective ends of the Canal. An unofficial news service for the benefit of persons at sea is carried on by the Colon station, which each day at 3.30 p.m. radiates broadcast about 200 words of news made up of extracts from the Panama morning papers.

We publish below the text of the various Acts and Decrees affecting radiotelegraphy in the Canal Zone in accordance with the following list:—

- A** Act to Regulate Radio Communication issued August 13th, 1912.
- B**—Section 6 of Act to Provide for Opening, Maintenance, Protection, and Operation of the Panama Canal (dated August 24th, 1912.)
- C**—Extracts from Rules and Regulations for the Operation and Navigation of the Panama Canal dated July 9th, 1914.
- D**—Notice concerning Commercial Service at Naval Stations dated September 1st, 1913.
- E**—Circular *re* Compulsory Wireless dated July 23rd, 1914.
- F**—Circular *re* Free Radio Service dated November 17th, 1914.
- G**—Circular *re* Suspension of Radio Service dated May 12th, 1917.
- H**—Extract from Supplement to Panama Canal Rules dated May 23rd, 1917.

AN ACT TO REGULATE RADIO COMMUNICATION.

A *Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,* That a person, company, or corporation within the jurisdiction of the United States shall not use or operate any apparatus for radio communication as a means of commercial intercourse among the several States, or with foreign nations, or upon any vessel of the United States engaged in interstate or foreign commerce, or for the transmission of radiograms or signals the effect of which extends beyond the jurisdiction of the State or Territory in which the same are made, or where interference would be caused thereby with the receipt of messages or signals from beyond the jurisdiction of the said State or Territory, except under and in accordance with a licence, revocable for cause, in that behalf granted by the Secretary of Commerce and Labour upon application therefor; but nothing in this Act shall be construed to apply to the transmission and exchange of radiograms or signals between points situated in the same State: *Provided,* That the effect thereof shall not extend beyond the jurisdiction of the said State or interfere with the reception of radiograms or signals from beyond said jurisdiction; and a licence shall not be required for the transmission or exchange of radiograms or signals by or on behalf of the Government of the United States, but every Government station on land or sea shall have special call letters designated and published in the list of radio stations of the United States by the Department of Commerce and Labour.

Any person, company, or corporation that shall use or operate any apparatus for radio communication in violation of this section, or knowingly aid or abet another person, company, or corporation in so doing, shall be deemed guilty of a misdemeanour, and on conviction thereof shall be punished by a fine not exceeding five hundred dollars, and the apparatus or device so unlawfully used and operated may be adjudged forfeited to the United States.

SEC. 2.—That every such licence shall be in such form as the Secretary of Commerce and Labour shall determine and shall contain the restrictions, pursuant to this Act, on and subject to which the licence is granted ; that every such licence shall be issued only to citizens of the United States or Porto Rico or to a company incorporated under the laws of some State or Territory or of the United States or Porto Rico, and shall specify the ownership and location of the station in which said apparatus shall be used and other particulars for its identification and to enable its range to be estimated ; shall state the purpose of the station, and, in case of a station in actual operation at the date of passage of this Act, shall contain the statement that satisfactory proof has been furnished that it was actually operating on the above-mentioned date ; shall state the wave-length or the wave-lengths authorised for use by the station for the prevention of interference and the hours for which the station is licensed for work ; and shall not be construed to authorise the use of any apparatus for radio communication in any other station than that specified. Every such licence shall be subject to the regulations contained herein, and such regulations as may be established from time to time by authority of this Act or subsequent Acts and treaties of the United States. Every such licence shall provide that the President of the United States in time of war or public peril or disaster may cause the closing of any station for radio communication and the removal therefrom of all radio apparatus, or may authorise the use or control of any such station or apparatus by any department of the Government, upon just compensation to the owners.

SEC. 3.—That every such apparatus shall at all times while in use and operation as aforesaid be in charge or under the supervision of a person or persons licensed for that purpose by the Secretary of Commerce and Labour. Every person so licensed who in the operation of any radio apparatus shall fail to observe and obey regulations contained in or made pursuant to this Act or subsequent Acts or treaties of the United States, or any one of them, or who shall fail to enforce obedience thereto by an unlicensed person while serving under his supervision, in addition to the punishments and penalties herein prescribed, may suffer the suspension of the said licence for a period to be fixed by the Secretary of Commerce and Labour not exceeding one year. It shall be unlawful to employ any unlicensed person or for any unlicensed person to serve in charge or in supervision of the use and operation of such apparatus, and any person violating this provision shall be guilty of a misdemeanour, and on conviction thereof shall be punished by a fine of not more than one hundred dollars or imprisonment for not more than two months, or both, in the discretion of the court, for each and every such offence: *Provided*, That in case of emergency the Secretary of Commerce and Labour may authorise a

collector of customs to issue a temporary permit, in lieu of a licence, to the operator on a vessel subject to the radio ship Act of June twenty-fourth, nineteen hundred and ten.

SEC. 4.—That for the purpose of preventing or minimising interference with communication between stations in which such apparatus is operated, to facilitate radio communication, and to further the prompt receipt of distress signals, said private and commercial stations shall be subject to the regulations of this section. These regulations shall be enforced by the Secretary of Commerce and Labour through the collectors of customs and other officers of the Government as other regulations herein provided for.

The Secretary of Commerce and Labour may, in his discretion, waive the provisions of any or all of these regulations when no interference of the character above mentioned can ensue.

The Secretary of Commerce and Labour may grant special temporary licences to stations actually engaged in conducting experiments for the development of the science of radio communication, or the apparatus pertaining thereto, to carry on special tests, using any amount of power or any wave lengths, at such hours and under such conditions as will insure the least interference with the sending or receipt of commercial or Government radiograms, of distress signals and radiograms, or with the work of other stations.

In these regulations the naval and military stations shall be understood to be stations on land.

REGULATIONS.

1. *Normal Wave Length.*—Every station shall be required to designate a certain definite wave length as the normal sending and receiving wave length of the station. This wave length shall not exceed 600 metres or it shall exceed 1,600 metres. Every coastal station open to general public service shall at all times be ready to receive messages of such wave lengths as are required by the Berlin convention. Every ship station, except as hereinafter provided, and every coast station open to general public service shall be prepared to use two sending wave lengths, one of 300 metres and one of 600 metres, as required by the international convention in force: *Provided*, That the Secretary of Commerce and Labour may, in his discretion, change the limit of wave length reservation made by regulations 1 and 2 to accord with any international agreement to which the United States is a party.

2. *Other Wave Lengths.*—In addition to the normal sending wave length all stations, except as provided hereinafter in these regulations, may use other sending wave lengths: *Provided*, That they do not exceed 600 metres or that they do exceed 1,600 metres: *Provided further*, That the character of the waves emitted conforms to the requirements of regulations 3 and 4 following.

3. *Use of a "Pure Wave."*—At all stations if the sending apparatus, to be referred to hereinafter as the "transmitter," is of such a character that the energy is radiated in two or more wave lengths, more or less sharply defined, as indicated by a sensitive wave metre, the energy in no one of the lesser waves shall exceed 10 per cent. of that in the greatest.

4. *Use of a "Sharp Wave."*—At all stations the logarithmic decrement per complete oscillation in the wave trains emitted by the transmitter shall not exceed two-tenths, except when sending distress signals or signals and messages relating thereto.

5. *Use of "Standard Distress Wave."*—Every station on shipboard shall be prepared to send distress calls on the normal wave length designated by the international convention in force, except on vessels of small tonnage unable to have plants insuring that wave length.

6. *Signal of Distress.*—The distress call used shall be the international signal of distress : . . . — — — . . .

7. *Use of "Broad Interfering Wave" for Distress Signals.*—When sending distress signals, the transmitter of a station on shipboard may be tuned in such a manner as to create a maximum of interference with a maximum of radiation.

8. *Distance Requirement for Distress Signals.*—Every station on shipboard, wherever practicable, shall be prepared to send distress signals of the character specified in regulations 5 and 6 with sufficient power to enable them to be received by day over sea a distance of 100 nautical miles by a shipboard station equipped with apparatus for both sending and receiving equal in all essential particulars to that of the station first mentioned.

9. *"Right of Way" for Distress Signals.*—All stations are required to give absolute priority to signals and radiograms relating to ships in distress ; to cease all sending on hearing a distress signal ; and, except when engaged in answering or aiding the ship in distress, to refrain from sending until all signals and radiograms relating thereto are completed.

10. *Reduced Power for Ships near a Government Station.*—No station on shipboard, when within fifteen nautical miles of a naval or military station, shall use a transformer input exceeding one kilowatt, nor, when within five nautical miles of such a station, a transformer input exceeding one-half kilowatt, except for sending signals of distress or signals or radiograms relating thereto.

11. *Intercommunication.*—Each shore station open to general public service between the coast and vessels at sea shall be bound to exchange radiograms with any similar shore station and with any ship station without distinction of the radio systems adopted by such stations, respectively, and each station on shipboard shall be bound to exchange radiograms with any other station on shipboard without distinction of the radio systems adopted by each station, respectively.

It shall be the duty of each such shore station, during the hours it is in operation, to listen in at intervals of not less than fifteen minutes and for a period not less than two minutes, with the receiver tuned to receive messages of 300 metre wave lengths.

12. *Division of Time.*—At important seaports and at all other places where naval or military and private or commercial shore stations operate in such close proximity that interference with the work of naval and military stations cannot be avoided by the

enforcement of the regulations contained in the foregoing regulations concerning wave lengths and character of signals emitted, such private or commercial shore stations as do interfere with the reception of signals by the naval and military stations concerned shall not use their transmitters during the first fifteen minutes of each hour, local standard time. The Secretary of Commerce and Labour may, on the recommendation of the Department concerned, designate the station or stations which may be required to observe this division of time.

13. *Government Stations to Observe Division of Time.*—The naval or military stations for which the above-mentioned division of time may be established shall transmit signals or radiograms only during the first fifteen minutes of each hour, local standard time, except in case of signals or radiograms relating to vessels in distress, as hereinbefore provided.

14. *Use of Unnecessary Power.*—In all circumstances, except in case of signals or radiograms relating to vessels in distress, all stations shall use the minimum amount of energy necessary to carry out any communication desired.

15. *General Restrictions on Private Stations.*—No private or commercial station not engaged in the transaction of *bona fide* commercial business by radio communication or in experimentation in connection with the development and manufacture of radio apparatus for commercial purposes shall use a transmitting wave length exceeding 200 metres, or a transformer input exceeding one kilowatt, except by special authority of the Secretary of Commerce and Labour contained in the licence of the station: *Provided*, That the owner or operator of a station of the character mentioned in this regulation shall not be liable for a violation of the requirements of the third or fourth regulations to the penalties of \$100 or \$25, respectively, provided in this section unless the person maintaining or operating such station shall have been notified in writing that the said transmitter has been found, upon tests conducted by the Government, to be so adjusted as to violate the said third and fourth regulations, and opportunity has been given to said owner or operator to adjust said transmitter in conformity with said regulations.

16. *Special Restrictions in the Vicinities of Government Stations.*—No station of the character mentioned in regulation 15 situated within five nautical miles of a naval or military station shall use a transmitting wave length exceeding 200 metres or a transformer input exceeding one-half kilowatt.

17. *Ship Stations to Communicate with Nearest Shore Stations.*—In general, the shipboard stations shall transmit their radiograms to the nearest shore station. A sender on board a vessel shall, however, have the right to designate the shore station through which he desires to have his radiograms transmitted. If this cannot be done, the wishes of the sender are to be complied with only if the transmission can be effected without interfering with the service of other stations.

18. *Limitations for Future Installations in Vicinities of Government Stations.*—No station on shore not in actual operation at the date of the passage of this Act shall be licensed for the transaction of commercial business by radio communication within fifteen nautical miles of the following naval or military stations—to wit: Arlington, Virginia; Key West, Florida; San Juan, Porto Rico; North Head and Tatoosh Island, Washington; San Diego, California; and those established or which may be established in Alaska and in the Canal Zone; and the head of the department having control of such Government stations shall, so far as is consistent with the transaction of governmental business, arrange for the transmission and receipt of commercial radiograms under the provisions of the Berlin convention of 1906 and future international conventions or treaties to which the United States may be a party, at each of the stations above referred to, and shall fix the rates therefor, subject to control of such rates by Congress. At such stations and wherever and whenever shore stations open for general public business between the coast and vessels at sea under the provisions of the Berlin convention of 1906 and future international conventions and treaties to which the United States may be a party shall not be so established as to insure a constant service day and night without interruption, and in all localities wherever or whenever such service shall not be maintained by a commercial shore station within 100 nautical miles of a naval radio station, the Secretary of the Navy shall, so far as is consistent with the transaction of governmental business, open naval radio stations to the general public business described above, and shall fix rates for such service, subject to control of such rates by Congress. The receipts from such radiograms shall be covered into the Treasury as miscellaneous receipts.

19. *Secrecy of Messages.*—No person or persons engaged in or having knowledge of the operation of any station or stations shall divulge or publish the contents of any messages transmitted or received by such station, except to the person or persons to whom the same may be directed, or their authorised agent, or to another station employed to forward such message to its destination, unless legally required so to do by the court of competent jurisdiction or other competent authority. Any person guilty of divulging or publishing any message, except as herein provided, shall, on conviction thereof, be punishable by a fine of not more than \$250 or imprisonment for a period of not exceeding three months, or both fine and imprisonment, in the discretion of the court.

Penalties.—For violation of any of these regulations, subject to which a licence under sections 1 and 2 of this Act may be issued, the owner of the apparatus shall be liable to a penalty of \$100, which may be reduced or remitted by the Secretary of Commerce and Labour, and for repeated violations of any of such regulations the licence may be revoked.

For violation of any of these regulations, except as provided in regulation 19, subject to which a licence under section 3 of this Act may be issued, the operator shall be subject to a penalty of \$25, which may be reduced or remitted by the Secretary of Com-

merce and Labour, and for repeated violations of any such regulations, the licence shall be suspended or revoked.

SEC. 5.—That every licence granted under the provisions of this Act for the operation or use of apparatus for radio communication shall prescribe that the operator thereof shall not wilfully or maliciously interfere with any other radio communication. Such interference shall be deemed a misdemeanour, and upon conviction thereof the owner or operator, or both, shall be punishable by a fine of not to exceed \$500 or imprisonment for not to exceed one year, or both.

SEC. 6.—That the expression "radio communication" as used in this Act means any system of electrical communication by telegraphy or telephony without the aid of any wire connecting the points from and at which the radiograms, signals, or other communications are sent or received.

SEC. 7.—That a person, company, or corporation within the jurisdiction of the United States shall not knowingly utter or transmit, or cause to be uttered or transmitted, any false or fraudulent distress signal or call or false or fraudulent signal, call, or other radiogram of any kind. The penalty for so uttering or transmitting a false or fraudulent distress signal or call shall be a fine of not more than \$2,500 or imprisonment for not more than five years, or both, in the discretion of the court, for each and every such offence, and the penalty for so uttering or transmitting, or causing to be uttered or transmitted, any other false or fraudulent signal, call, or other radiogram shall be a fine of not more than \$1,000 or imprisonment for not more than two years, or both, in the discretion of the court, for each and every such offence.

SEC. 8.—That a person, company, or corporation shall not use or operate any apparatus for radio communication on a foreign ship in territorial waters of the United States otherwise than in accordance with the provisions of sections 4 and 7 of this Act and so much of section 5 as imposes a penalty for interference. Save as aforesaid, nothing in this Act shall apply to apparatus for radio communication on any foreign ship.

SEC. 9.—That the trial of any offence under this Act shall be in the district in which it is committed, or if the offence is committed upon the high seas or out of the jurisdiction of any particular State or district the trial shall be in the district where the offender may be found or into which he shall be first brought.

SEC. 10.—That this Act shall not apply to the Philippine Islands.

SEC. 11.—That this Act shall take effect and be in force on and after four months from its passage.

Approved, August 13th, 1912.

EXTRACT FROM ACT.
(Dated August 24th, 1912.)

TO PROVIDE FOR OPENING, MAINTENANCE, PROTECTION AND OPERATION
OF THE PANAMA CANAL.

SEC. 6.—That the President is authorised to cause to be
B erected, maintained, and operated, subject to the International Convention and the Act of Congress to regulate radio communication, at suitable places along the Panama Canal and the coast

adjacent to its two terminals, in connection with the operation of said Canal, such wireless telegraphic installations as he may deem necessary for the operation, maintenance, sanitation, and protection of said Canal, and for other purposes. If it is found necessary to locate such installations upon territory of the Republic of Panama, the President is authorised to make such agreement with said Government as may be necessary, and also to provide for the acceptance and transmission, by said system, of all private and commercial messages, and those of the Government of Panama, on such terms and for such tolls as the President may prescribe: *Provided*, That the messages of the Government of the United States and the departments thereof, and the management of the Panama Canal, shall always be given precedence over all other messages. The President is also authorised, in his discretion, to enter into such operating agreements or leases with any private wireless company or companies as may best insure freedom from interference with the wireless telegraphic installations established by the United States.

EXTRACT FROM RULES AND REGULATIONS.

(Dated July 9th, 1914.)

40. *Radio Communication and Report.*—As soon as radio communication can be established with the Canal, vessels should report their names, nationality, length, draft, tonnage, whether or not they desire to pass through the Canal, require coal, provisions, supplies, repairs, to go alongside of a wharf, the use of tugs, probable time of arrival, length of stay in port, or any other matters of importance or interest. If this information has been previously communicated through agents or otherwise to the captain of the port, it will not be necessary to report by radio; but the probable time of arrival should always be sent.

41. Control of radio communication is entirely in the hands of the radio shore stations. No vessel will be allowed to interfere in the slightest degree with the Canal radio stations; upon an order being received by a vessel at any time while within the waters under the control of the Canal to discontinue using radio, even if in the midst of transmission of a message, she shall immediately comply.

42. Upon a ship's arriving within the 15-mile limit, and until leaving the 15-mile limit of the Canal Zone, she shall transmit only with low power, not exceeding one-half kilowatt.

43. Messages to stations will be sent only to Colon station (NAX) when in Gatun Locks and to northward thereof, and only to Balboa station (NPJ) when in Miraflores Locks and to southward thereof; between these two points ships may work to either station, preferably to the nearer one; the high-power station (Darien) at Radio will not handle commercial work and will not be called for Canal business except in case of emergency.

44. All messages between ships in the Canal Zone and ships at sea must be forwarded through the nearer shore station.

45. Messages from ships in the Caribbean Sea for ships in the Pacific waters, or *vice versa*, shall be routed through the Canal Zone shore stations.

46. All vessels fitted with radio, after leaving the terminal harbour to pass through the Canal, shall keep an operator on watch until the further terminal harbour has been reached; this applies to the time when they are anchored in Gatun Lake, while passing through the locks, or moored to the lock walls, or to any of the wharves in the Canal proper, as well as when they are under way. Messages relating to the ship's movements and the Canal business shall take precedence over all commercial messages.

47. Pilots on vessels passing through the Canal shall have the right to use a vessel's radio freely for the transaction of the Canal business.

48. Under the direction of the pilots, vessels will from time to time report their progress through the Canal; accidents to machinery, propellers, steering gear, equipment, or anything else that may delay them or require assistance; any sickness or casualties that require medical attendance from Canal officials; or any other matters of importance that may arise.

49. No charges will be imposed against the Canal by vessels receiving or sending messages in relation to Canal business.*

50. No vessel will be allowed to communicate with any lock or signal station while in transit through the Canal, except through the pilot; all messages of any kind must be sent through him. This does not apply to vessels moored at the terminals at Cristobal or Balboa, before entering or after having passed through the Canal, which may wish to communicate through the terminal stations.

51. Vessels in transit through the Canal can communicate with the locks and signal stations, through the pilots, both by the international code and special signals; information on this subject may be obtained from the Governor of the Panama Canal.

52. *Accidents or Defects.*—If any defect in any part of a vessel's hull, machinery, steering gear or equipment be discovered while in transit through the Canal, of such a serious nature that it might interfere with the further passage of the vessel, or be liable to block the Canal, the vessel shall stop and, if practicable, be anchored or moored at the first available place. A full report shall immediately be made to the Superintendent of Transportation,† through the Captain of the Port, stating fully the cause and nature of the trouble, probable delay, and request for assistance if it be necessary.

53. Under any and all circumstances, whenever a vessel is liable to become unmanageable from any weakness, or damage to her machinery, steering gear, or for any other reason, she shall immediately, through the pilot, request the assistance of a tug.

54. *Firearms.*—No firearms of any kind shall be discharged while in transit through the Canal or in Canal waters, and every precaution will be taken to prevent this.

* Amended by Executive Order of November 4th, 1914, to read: "No radio tolls, either coast station or forwarding, will be imposed against ships on radiograms transmitted by ships on Canal business. There will be no charge made against the Panama Canal, by Canal Zone land lines or radio stations, for the transmission of radiograms to ships on Canal business."

† Title changed to *Marine Superintendent*.

55. *Subsistence of Pilots.*—Pilots and other authorised persons on duty, belonging to the Canal service, shall be subsisted without charge while on board vessels in transit through the Canal.

56. *Maintenance of Tugs and Other Floating Equipment.*—No vessel, company, nor individual will be authorised to maintain or operate permanently any tugs, launches, lighters, or floating equipment of any kind within the Canal waters without permission from the Governor; nor shall any small craft or boat of any kind be operated without the proper authority from him.

118. In thick and foggy weather vessels will not be allowed to enter the Canal or leave the locks or mooring station until the weather has cleared. Vessels in transit, when overtaken by thick or foggy weather, must immediately take every precaution and make preparation to anchor or moor at the first available place, and so remain until the weather clears. Vessels equipped with radio, when overtaken by thick or foggy weather, should immediately so report, in order that the proper fog signal may be made at the mooring stations on the approach of such vessels.

EXTRACT FROM SUPPLEMENT TO RULES.

(Dated September 1st, 1913.)

COMMERCIAL SERVICE AT NAVAL RADIO STATIONS.

D Beginning September 1st, 1913, the radio stations of the United States Navy at Colon and Balboa are handling special classes of commercial radiograms, heretofore prohibited, as follows :—

1. Reply paid messages (where both message and answer can be prepaid by the sender).
2. Messages calling for repetition of messages (for verification only). Charge for repeating back is one-fourth the charge for the original message.
3. Radiograms to be delivered by mail. (If received from a ship, these will be mailed from the radio station. "Ocean letters" will be mailed by the ship at the first port of call, or at any port of call designated.)
4. Multiple radiograms. These are messages addressed either to several persons at same address, or to same person at several addresses served by the same radio station. These messages when received from sea will be separated and sent as so many individual messages over the land wire.
5. Radiograms calling for acknowledgment of receipt. (Such acknowledgment is restricted to notification of date and hour at which the coast station delivered the radiogram to ship addressed, and may be sent by either mail or telegraph.)
6. Paid service notices. (Sent in order to correct address or text, to cancel a message, etc.)

Both stations, Colon and Balboa, are connected by direct wire with the Panama railroad telephone system and radiograms can be filed at any local office. Attention is invited to the fact that no collect messages are handled, and no commercial messages are handled between stations which are connected by cable or telegraph, as, for instance, to Key West or Port Limon.

The time of arrival of all Panama railroad boats is given to the

telephone central at Colon as soon as received, and can be obtained there upon request without calling the radio station at Colon.

EXECUTIVE ORDER.

E

WIRELESS APPARATUS ON OCEAN-GOING VESSELS.

Published in Circular No. 601-16, dated Culebra, C.Z., July 23rd, 1914.

To Require Ocean-going Vessels to be Fitted with Wireless Apparatus.

By virtue of the authority vested in me, I hereby establish the following order for the Canal Zone :—

SEC. 1.—From and after the first day of July, 1915, it shall be unlawful for any ocean-going steamer of the United States, or of any foreign country, carrying fifty or more persons including passengers and crew, to leave or attempt to leave any port of the Canal Zone unless such steamer shall be equipped with an efficient apparatus for radio communication in good working order in charge of a person skilled in the use of such apparatus, which apparatus shall be capable of transmitting and receiving messages for a distance of at least 100 miles, night or day : *Provided*, That the provisions of this order shall not apply to steamers plying only between the Canal Zone and ports less than 200 miles therefrom.

SECT. 2.—The master or other person being in charge of such vessel which leaves or attempts to leave any port of the Canal Zone in violation of any of the provisions of this order shall, upon conviction, be fined in a sum not to exceed Five Thousand Dollars (\$5,000), and any such fine shall be a lien upon such vessel, and the vessel may be liable therefor in the District Court of the Canal Zone, and the leaving or attempting to leave by any vessel from each and every port of the Canal Zone shall constitute a separate offence.

SEC. 3.—This order shall take effect from and after this date. July 9th, 1914.

EXECUTIVE ORDER.

FREE RADIO SERVICE FOR CANAL BUSINESS.

Published in Circular No. 601-33, dated Balboa Heights, C.Z., November 17th, 1914.

Amending Paragraph 49 of the " Rules and Regulations for the Operation and Navigation of the Panama Canal and Approaches Thereto, Including All Waters Under Its Jurisdiction."

F

By virtue of the authority vested in me under the Panama Canal Act, paragraph 49 of the " Rules and Regulations for the Operation and Navigation of the Panama Canal and Approaches Thereto, Including All Waters Under Its Jurisdiction," promulgated by Executive Order No. 1990, dated July 9th, 1914, is hereby amended to read as follows :—

49. No radio tolls, either coast station or forwarding, will be imposed against ships on radiograms transmitted by ships on Canal business. There will be no charge made against the Panama Canal, by Canal Zone land lines or radio stations, for the transmission of radiograms to ships on Canal business.

NOTICE TO MARINERS.

SUSPENSION OF RADIO SERVICE IN CANAL ZONE WATERS.

Published in Circular No. 643-38, dated from Balboa Heights, C.Z.,
May 12th, 1917.

G For the information of ships' masters, it is desired to explain the cause of the general suspension of radio (wireless) service in Canal Zone ports. The objects are to protect merchant ships from capture and to leave the air free for radio orders to warships. All merchant ships should avoid the use of radio as much as possible for the reason that to a ship properly equipped it gives accurate indication of the bearing and distance of a ship sending out radio messages. The Canal Zone radio stations have orders not to exchange messages with merchant ships, although an exception is made when a ship arrives off the entrance to either terminal port, at which time she is permitted to notify the Captain of the Port, by radio, of her arrival. Thereafter, while in Canal Zone waters, she is forbidden to use radio except as directed by the pilot in communicating with Canal Zone officials on Government business.

EXTRACT FROM SUPPLEMENT TO RULES.

(Dated May 23rd, 1917.)

H RULE 12.—The radio installation of any public or private vessel or of any auxiliary vessel of a belligerent, other than the United States, shall be used only in connection with the Canal business to the exclusion of all other business while within the waters of the Canal Zone, including the waters of Colon and Panama harbours.

PANAMA (REPUBLIC OF)

(See 5th Clause of PANAMA (CANAL ZONE), page 421.)

PARAGUAY

THE Inland Republic of South America known as Paraguay is divided into two distinct portions by the river bearing the same name. The first Spanish Colony was settled in 1535, and the country remained under Spanish rule until 1811. After a number of vicissitudes, the present constitution was proclaimed on the 25th November, 1870. The legislative authority is vested in a Congress of two houses, the executive being entrusted to a President, assisted by five Ministers.

There are three wireless stations in Paraguay at present open to the public. They have been erected by, and are the property of, the Government, and their control is vested in the Director of Posts and Telegraphs. These stations are situated at Asuncion, the capital of the Republic (or—more strictly—Lambare, on the outskirts thereof), Concepcion, and Encarnacion. They are identical in capacity and possess a radius of 300 miles by day and 600 miles by night.

There are no *privately-owned stations*. The Government has instituted a wireless telegraph school which is attached to the College of Military and Naval Cadets.

The Paraguayan wireless service is at present confined to the interior of the country, for the Governments of Paraguay and Argentina have not yet been able to come to a working agreement.

There are no special laws or regulations affecting the subject, with the exception of a decree dated July 20th, 1916, the text of which will be found below.

DECREE DATED JULY 20TH, 1916.

The Radiotelegraphic Stations working in Asuncion and in the cities of Concepcion and Encarnacion must, in the course of their execution of the public service entrusted to them, maintain in the most precise manner the neutrality of the Republic during the course of the present war.

ART. 1.—The Director-General of Posts and Telegraphs shall take the necessary measures for the most meticulous observance of neutrality in the working of the new offices in accordance with the current postal and telegraph regulations.

ART. 2.—No one shall be included in any part of the personnel employed in this service, either as receiver of messages, operator, etc., who is a subject of any of the belligerent nations, or of those States which (though not belligerent) have broken off neutrality, *vis-à-vis*, with either side in the conflict, in accordance with the official declaration of the said States.

ART. 3.—The foregoing regulations are confirmed with regard to the Radiotelegraphic Stations.

ART. 4.—This decree shall be issued, printed and published in the "Official Gazette."

PERU (REPUBLIC OF)

THE Republic of Peru, formerly the most important Spanish Viceroyalty in South America, declared its independence on July 28th, 1821, but was not actually free until three years later. Its constitution was proclaimed on November 10th, 1860, and entrusts the Executive power to a President, the legislation being in the hands of a Senate and House of Representatives. Territorially it is divided into nineteen departments and three provinces; the total area being estimated at 722,461 square miles. The capital City is Lima, which is closely connected with Callao, the leading port on the Pacific coast.

The administration of radiotelegraphy is not vested in the Postmaster-General, but is directed by the Ministerio de Fomento (Minister for Progress and Public Works).

There are a number of radiotelegraphic stations in Peru (see our "Land and Ship Stations" section), but up to the time of going to Press we have not received the text of any laws and regulations affecting them.

PORTUGAL

AN independent State since the twelfth century, "England's Oldest Ally" remained a monarchy until 1910. On October 5th of that year the Republic was proclaimed, and on August 20th, 1911, the present Constitution was established. Affairs are administered by a President, the two Chambers reserving to themselves the Legislative functions.

Portugal holds some important colonies and possessions in India, China, Malaya, and Africa. The area of the Mother Country (including the Azores and Madeira, which are considered integral parts thereof) amounts to 35,490 square miles.

Wireless telegraphy is supervised by the Director-General of Posts and Telegraphs, so far as general purposes and commercial usage are concerned, and the regulating of ship and shore communication is also in his hands. The Minister of War, Marine, and Colonies controls the special applications thereof, wherein radiotelegraphy is employed for purposes of national defence by the Army and Navy.

The current laws and regulations (which are reprinted below) comprise :—

A—Act of July 15th, 1913.

B—Regulations.

THE ACT OF JULY 15TH, 1913.

A 1. On the expiration of a period of three months from the approval of the Regulation for the execution of the present law, no Portuguese steam vessel, with accommodation for more than fifty passengers (including crew), shall be permitted to sail from any port without having installed a wireless telegraph apparatus of the system which suits it best, in good working order, and capable of dispatching and receiving radiotelegrams within a radius of action which must never be less than 100 miles.

(a) From this provision those steamers are excepted which navigate only between ports situated at distances of less than 200 miles.

(b) For steam vessels, which navigate in the Colonies where there are coastal radiotelegraph stations, and which only occasionally come to the Metropolis, the period granted for the installation of wireless telegraphy, to which the present article refers, shall be six months.

2. The wireless telegraph material of a vessel, and the respective service of transmission and reception of radiotelegrams, shall be under the charge of one or more duly qualified telegraphists.

§ The number of telegraphists, their qualifications, and that of the indispensable auxiliary staff, the organisation of their technical instruction, provisions with respect to the service of supervision, conditions of the installation of the apparatus, and the official verification of their working, shall be determined pursuant to the Regulation drawn up for the execution of the present law.

3. It is the province of the captain of the vessel to give instructions and orders for the complete carrying out of the laws and regulations in force with respect to the radiotelegraphic service, and he shall exercise the necessary supervision, carrying out and causing to be carried out any provisions which he may consider advantageous for the good working of the said service.

4. The captain shall be held responsible for any negligence in complying with the requirements of Article 1, and on conviction he shall be liable to a fine not exceeding Rs.200 and the suspension of his master's certificate for one year.

5. Negligence or failure on the part of the captain to carry out the provisions of Article 3 shall render him liable to a fine not exceeding Rs.50, which may be accompanied with imprisonment not exceeding one month after the first offence.

6. If there should be a disaster, stranding or loss of the vessel, resulting from the lack of vigilance of the telegraph staff, and the said fault was due to the negligence of the captain in failing to carry out and causing to be carried out the provisions in force relating to the radio-telegraph service, the captain shall be liable to a fine not exceeding Rs.200, accompanied or not, according to the gravity of the offence, with suspension of his certificate for a period from one to five years.

If the serious injury, or the death, of one or more persons should result from the disaster, the penalties applicable shall be respectively those laid down in Articles 368 and 369 of the Penal Code.

7. The offences referred to in Articles 4, 5 and 6 constitute maritime crimes, and shall be judged by the Commercial Maritime Tribunal pursuant to the Disciplinary Code of the Mercantile Marine.

8. All the wireless apparatus intended for Portuguese vessels shall be exempt from Customs and Municipal Duty.

9. Any legislation contrary hereto is hereby repealed.

REGULATIONS.

B The following regulations were issued on August 29th, 1913:—

1. Ships may be equipped with any wireless telegraph apparatus which is in keeping with scientific progress.

2. The shipping or any other company may establish and work a wireless telegraph station on board ship. The station must possess a licence granted by the Government of the nationality to which the ship belongs. The "class" of the station is mentioned in the licence.

3. There are three classes:—

(a) Long voyage passenger steamers with accommodation for more than 150 passengers must maintain continuous service.

(b) The same type of steamer with accommodation for less than 150 passengers must maintain continuous *receiving* service, whereas the transmission may be limited.

(c) Cargo or fishing boats, or vessels carrying more than 50 persons (including crew), may have limited service.

4 and 5. Wave-lengths of 300 m., 600 m., and more than 1,800 m. may be employed. Small boats may work on a 300 m. wave when sending, but 600 when receiving. The waves must be as pure and as undamped as possible.

The oscillator must not be directly connected to the antennæ, except in case of distress, or on certain small steamers where the energy employed in the primary does not exceed 50 watts.

6. The cabin must be divided into two parts so that the transmitting gear and the spark gap may be separated from the receiving apparatus. Double walls must be used to isolate the interior from the exterior.

7. The instruments must be able to receive and send 100 letters per minute.

8. New installations employing a power of more than 50 watts must possess such arrangements as will enable them to have a range inferior to their normal, the smallest being approximately 15 miles. All old stations must be brought to this standard as soon as possible.

9. The receiving instruments must be able to tune for waves up to 600 m., being highly protected against perturbations.

10. The power measured at the terminals of the generator must not exceed 1 kw. in normal circumstances. An increase is allowed when a station desires to communicate with a land station other than the nearest, at a distance of more than 200 miles from the nearest land station, and when, in exceptional circumstances, the communication cannot be effected with 1 kw.

11. First and second class steamers must carry an emergency set in as safe a place as is possible. The emergency set must be able to work for six hours at least at a distance of 80 miles for first class, and 50 miles for second-class steamers.

12. The apparatus must be operated by a telegraphist who possesses a certificate from the Portuguese Government, or, in urgent cases and for one trip only, from any other Government which has signed the International Convention :

13. There are two certificates :—

(a) 1st Class (same as International);

(b) 2nd Class (12 words, adjustment of apparatus, knowledge of each instrument and its work, and rules *re* handling of telegrams).

Service.—Any member of the crew able to assist the telegraphist in his work, and possessing a knowledge of the operation of the apparatus, may be an “auxiliary” operator.

14. Second class telegraphists may be employed on board where the wireless service is only for the shipping company's requirements, or on fishing vessels, or they may act as assistants in cases where there is already one first class operator. On first class steamers *two* first class telegraphists must be employed.

15. On second class steamers, one first class and one second class telegraphist should be employed ; on third class vessels one second class telegraphist will suffice.

Service.—As long as land stations do not exist in the Portuguese colonies, Portuguese steamers plying there are allowed to carry one first class telegraphist and one “auxiliary.”

16. Transmitting must be performed by a first or a second class telegraphist, except in urgent cases.

17. The certificates state that the telegraphist has taken an oath of secrecy with regard to the correspondence.

18. The captain has authority over the working of the station.

19. Portuguese operators are preferred.

20. Should none be obtainable, foreigners may be employed if they are in possession of the Portuguese Government's certificate.

In urgent cases where no certificated telegraphist is available, provisional certificates may be issued for one voyage.

21. Certificates are supplied by the Commission after the examination of the telegraphist.

22 and 23. Captains are also bound by an oath of secrecy.

32. All telegrams sent and received on board must be registered by the captain on forms supplied by the Government. The date and hour of the sending or reception of these telegrams must be indicated.

33. Only the telegraphists and the captain are allowed to enter the wireless cabin.

34. The wireless room and the bridge must be connected by either a speaking tube or a telephone, unless they are within easy distance of one another.

PORTO RICO

(See WEST INDIES (AMERICAN), page 558.)

PUERTO RICO

(See WEST INDIES (AMERICAN), page 558.)

RHODESIA

CECIL RHODES, the "Colossus of South Africa" (*floruit* 1853-1902) has bequeathed his name to British Colonies covering an area of over 438,575 square miles. Rhodesia is bounded on the south by the Transvaal, on the north by the Congo State, and what used to be "German East Africa." On the east lies Portuguese East Africa, and on the west the Congo State, Bechuanaland, and Portuguese West Africa.

For administrative purposes this vast territory is divided into Northern and Southern Rhodesia, the Rhodesian Chartered Company governing under the proscription of British Orders in Council.

NORTHERN RHODESIA.

In this Administrative Division the headquarters are located at Livingstone. The whole district is mainly agricultural, and possesses no wireless installations. There are therefore no laws and regulations affecting radiotelegraphy at present in force.

SOUTHERN RHODESIA.

Southern Rhodesia, whose centre is at Salisbury, regulates radiotelegraphy within its border by the "Electric Telegraph Amendment Ordinance" of 1904, and sundry Postal Notices of 1912, the text of which will be found below.

Wireless Telegraphy is under the control of the Department of the Administrator, and the principal assistants of the Postmaster-General in such matters are the Government Electrical Inspectors at Salisbury and Bulawayo. There are no *Wireless Clubs* or *Societies*.

A—Electric Telegraph Amendment Ordinance, 1904.

B—Postal Notice No. 55 of 1912.

C—Postal Notice No. 391 of 1912.

TELEGRAPH (AMENDMENT) ORDINANCE.

A The term "electric telegraph" whenever used in the "Electric Telegraph Act, 1861," or any law amending the same or relating to "electric telegraphs," shall be interpreted as including any system or means of conveying signs, signals, or communications by electricity, magnetism, electro-magnetism, or other like

agency, and whether with or without the aid of wires, and including the system commonly known as wireless telegraphy, or ætheric signalling, and any improvements or developments of such system; and the term "line of electric telegraph" shall be interpreted as including any apparatus, instrument, mast, standard, wire, substance, matter, or thing whatever, which is, or may be, used for the purpose of sending, transmitting, conveying, or receiving such signs, signals, or communications.

2. The meaning of the term "person" shall be further extended so as to include individuals, partnerships, companies, and corporations.

3. The provision of the first section of the said Act as to its application to Southern Rhodesia shall be read and construed as including the territorial waters thereof.

4. Within Southern Rhodesia, or the territorial waters thereof, no person not thereto expressly authorised by some law shall erect or make use of any mast, standard, or apparatus of any kind, for the purpose of signalling without wires by means of electricity, magnetism, electro-magnetism, or other like agency, or shall erect or construct any line of electric telegraph, except under a licence to be granted by the Administrator.

5. The Administrator may authorise the issue of a licence for the establishment or use of any apparatus or installation for the transmission of signs, signals, or communications, by electric telegraph, with or without the aid of wires, and may revoke the same at any time, and there shall be payable annually in respect of such a licence such sum not exceeding One Hundred Pounds sterling, as may be fixed by regulation.

6. The terms and conditions of such licence, and the duration thereof, shall be subject to such regulations as may from time to time be made by the Administrator.

7. Any person who shall establish or use, or attempt to establish or use, any such apparatus or installation as is mentioned in Sections 1 and 4 of this Ordinance, in contravention of the provisions thereof, or of any other law relating to electric telegraphs, or of any regulation thereunder, shall be liable upon conviction to forfeit all apparatus so used, and to a penalty not exceeding Two Hundred and Fifty Pounds, and, in default of payment, to imprisonment, with or without hard labour, for a period not exceeding three months, and, in case of a second or subsequent conviction, in addition to such forfeiture to a penalty not exceeding Five Hundred Pounds, or in default of payment to imprisonment, with or without hard labour, for a period not exceeding six months.

8. Any Magistrate or Justice of the Peace before whom information shall be given on oath by credible persons, that the provisions of this Ordinance are being, or have been, or are likely to be infringed, may issue a search warrant, and authorise the seizure of any instruments, apparatus or appurtenances reasonably suspected to be intended for use in such contravention.

9. Notwithstanding the provisions of Section 4 of "The Electric Telegraph Act, 1861," all regulations made under the authority of that Act shall be published in the *Gazette*, and be subject, *mutatis mutandis*, to the provisions of Section 7 of Act No. 5 of 1883 of the Cape of Good Hope.

10. This Ordinance may be cited as the "Electric Telegraph Amendment Ordinance, 1904," and shall be read as one with "The Electric Telegraph Act, 1861," of the Cape of Good Hope, and the "Telegraph Protection Ordinance, 1901," and the said laws may be cited together as the "Electric Telegraph Laws, 1861 to 1904."

POSTAL NOTICE No. 55 OF 1912.

B Public attention is hereby directed to the provisions of the "Electric Telegraph Amendment Ordinance, 1904," under which no person not thereto expressly authorised by some law shall erect or make use of any mast, standard or apparatus of any kind for the purpose of signalling without wires by means of electricity, magnetism, electro-magnetism or other like agency, or shall construct any line of electric telegraph except under a licence to be granted by the Administrator.

The term "Line of Electric Telegraph" is defined as any apparatus, instrument, mast, standard, wire, substance, matter or thing whatever which is or may be used for the purpose of sending, transmitting, conveying or receiving signs, signals or communications.

All persons having, or desiring to have, such lines of electric communication, including telephone lines, whether on their private property or otherwise, are hereby notified that application for licence to use such lines must be made to the Administrator through the Postmaster-General.

The licence fees payable in respect of such lines, as published in Government Notice No. 391 of 1912 are as follow :—

(a) 1s. per annum for a private telephone or telegraph line exclusively on the private property of the person constructing and using the same ;

(b) 10s. per annum for a private telephone or telegraph line passing beyond the boundaries of the owner's land. (The licence does not confer any right to erect telephone or telegraph lines outside the boundaries of the applicant's land, and the applicant must make his own arrangements in this regard) ;

(c) £50 per annum for any installation of wireless telegraphy or telephony.

All persons having in use lines of electric communication which have not been authorised by the Administrator are hereby notified that unless the required permission be applied for within one month of the date of publication of this Notice they will render themselves liable to the penalties provided in Section 7 of the Telegraph Ordinance above referred to.

GOVERNMENT NOTICE.

No. 391 of 1912.

DEPARTMENT OF POSTS AND TELEGRAPHS.

The Treasury, Salisbury, December 19th, 1912.

C It is hereby notified for public information that His Honour the Acting Administrator, with the advice of the Executive Council, has been pleased to approve of the following Regulations regarding the issue of licences for installations of private tele-

phones, telegraphs, or other means of electric communication, whether with or without wires, in terms of section 5 of the "Electric Telegraph Amendment Ordinance, 1904."

By command of His Honour the Acting Administrator in Council.
P. D. L. FYLNN, Acting Treasurer.

When any person is authorised to establish or use any means of electric communication as defined in the "Electric Telegraph Amendment Ordinance, 1904," the Postmaster-General may issue to such person an annual licence for the use of such line on payment in advance of the undermentioned fees, namely :—

(a) 1s. per annum for a private telephone or telegraph line exclusively on the private property of the person constructing and using the same ;

(b) 10s. per annum for a private telephone or telegraph line passing beyond the boundaries of the owner's land. (The licence does not confer any right to erect telephone or telegraph lines outside the boundaries of the applicant's land, and the applicant must make his own arrangements in this regard) ;

(c) £50 per annum for any installation of wireless telegraphy or telephony.

RUSSIA

UNTIL March, 1917, this vast area was administered by Czar Nicholas II., who was descended, in the female line, from Michael Romanoff, elected Czar in 1613 after the extinction of the House of Rurik. At the date above referred to, the Russian Duma carried through a *coup d'état*, as a result of which Czar Nicholas abdicated. At the time of going to press, the Constitution is still not crystallised out of solution, and it is hardly possible to speak definitely as to the shape it may ultimately assume.

Wireless Telegraphy is very extensively used throughout these wide territories ; but we are not at present in a position to do more than reprint the old regulations.

A—Statute.

B—Regulations.

C—Decree of February 20th, 1908.

The following Statute and Regulations have been adopted for the institution of an inter-departmental Radiotelegraphic Committee :—

STATUTE.

A 1. To establish the attached regulations concerning an inter-departmental Radiotelegraphic Committee and the necessary personnel.

2. To make Paragraph 1 effective as from July 1st, 1912.

3. To allot for the expenses of the said Committee (13,200 roubles annually) from the Imperial Treasury commencing from the year 1913 and to debit the expenses for 1912 (amounting to 6,600 roubles) to the anticipated surplus on the estimates for 1912.

REGULATIONS.

1. An inter-departmental Committee is instituted for the **B** co-ordination of the work of the various departments relating to the existence and use of the Imperial network of radio-telegraphic and radiotelephonic stations and for the consideration of schemes for the establishment and maintenance of radio-telegraphic and radiotelephonic communication which require preliminary discussion between the departments affected thereby.

This Committee is attached to the Headquarters Staff of the Postal Telegraph Department.

2. The Committee shall consist of a President and of permanent members appointed by the Ministries of the Interior, of War, of Marine, of Commerce and Industries, of Routes of Communication and of Foreign Affairs. When schemes for the establishment and exploitation of radiotelegraphic and radiotelephonic stations for the use of the Ministry of Finance or other departments are under consideration representatives of the department in question shall be appointed to attend the meetings of the Committee and have the right to vote.

When legal aspects of radiotelegraphic and radiotelephonic communication are under discussion a representative of the Ministry of Justice shall be invited to attend and shall have the right to vote.

3. The Ministers of the Interior, of War, of Marine, of Routes of Communication and of Commerce and Industries shall each appoint two members to the Committee and the Ministry of Foreign Affairs shall appoint one member.

When necessary the Ministry of the Imperial Court shall appoint two representatives to attend the meetings of the Committee and the Ministry of Justice or other Ministries shall each appoint one member.

In the event of the representative of any of the Ministries being unable to attend the meetings of the Committee the Ministry in question may appoint a temporary substitute.

4. The President of the Committee and one of the permanent members of each department that furnishes two members must have special scientific and technical knowledge, and any temporary substitute appointed to represent these must be in possession of the same qualifications.

The President of the Committee shall be appointed by His Imperial Majesty on the recommendation of the aforesaid Ministers and the members of the Committee.

The members of the Committee can be appointed without any regard as to their rank.

During the absence of the President the fulfilment of his duties shall devolve upon one of the members appointed by the Ministry of the Interior.

5. The duties of the Committee are as follows:—

(a) The examination of schemes which have been worked out by the various departments for radiotelegraphic and radiotelephonic installations with the object of co-ordinating them and of fitting them into a general plan for a network of radio-telegraphic and radiotelephonic stations throughout Russia.

(b) The regulation of the mutual relations between the radiotelegraphic and radiotelephonic stations of different departments during their operations.

(c) The examination of matter relating to communication between ship and shore stations.

(d) The consideration of proposals made by various departments for the issue of new laws, rules, and regulations concerning radiotelegraphic and radiotelephonic communication.

(e) The preparation of materials and questions to be brought forward by Russia for discussion at International Radiotelegraphic and Radiotelephonic Conferences.

(f) The drafting of general technical regulations, rules, and standards relating to radiotelegraphic and radiotelephonic installations.

(g) The investigation of the general requirements of Russia in the matter of specialists in radiotelegraphy and telephony, and in the matter of their education and of the right to radiotelegraphic and radiotelephonic communication.

(h) Action as consultants in connection with questions concerning radiotelegraphic and radiotelephonic communications which may be referred to the Committee by various departments and particularly the examination of and reporting upon the practical value of new inventions relating to radiotelegraphy and radiotelephony.

(i) All other matters and questions concerning radiotelegraphic and radiotelephonic communication.

6. All matters and questions relating to radiotelegraphic and radiotelephonic communication enumerated in Sections (a) to (e) and (h) of the preceding paragraph (5) shall be brought forward by the various departments for the decision of the Committee.

Matters indicated in Sections (f), (g), and (i) of the same paragraph shall be examined by the Committee either on their own initiative or at the request of the departments interested.

7. Matters shall be submitted to the Committee in accordance with the instructions and resolutions of Ministers or Commanders-in-Chief in a complete form and with a definitely worded request from the department.

8. Communications between the President of the Committee and the Senate or the Chiefs of Headquarters or Chiefs of Departments or their subordinates or Governors shall be made in accordance with Clauses 233-236 of the Institution of Ministries.

9. For the preliminary technical consideration of complicated affairs the Committee shall be empowered to appoint, when required, special sub-committees consisting of members of the Committee who are particularly concerned in the matter and of well-informed persons who may be invited by the Committee and who will have the right to vote at the meeting of the sub-committees. At such meeting a member chosen by the Committee will preside.

10. For the carrying out of scientific and technical researches the Committee shall be permitted to use the laboratories of the Chamber

of Weights and Measures and of other institutions in St. Petersburg, under conditions to be defined by special agreement between the Ministry of the Interior and other Ministries.

11. The final preparation and presentation of affairs to the Committee will be performed by one of the permanent members. Matters of a departmental character will be presented by a representative of the Ministry responsible for bringing the matter before the Committee for consideration.

12. The Committee will meet, by order of the President, at the Headquarters of the Postal Telegraph Department, not less than once per month, with the exception of the summer holiday season, when meetings will be convened as required.

13. To form a quorum at meetings, the attendance is required of the representatives of the department which has introduced the business under discussion, and of at least one permanent member each from the Ministries of the Interior, of War, of Marine, and of Commerce and Industries.

14. All affairs in the Committee shall be decided by a simple majority of votes, each department having only one vote through its representatives. At meetings of sub-committees questions shall be decided by a simple majority of votes of all members of the sub-committee, including experts who may have been invited to attend the meetings.

In case of the votes of two parties being equal, the President shall give the casting vote.

15. In case of a department disagreeing with a decision of the Committee, the latter may, if they consider it necessary, refer the matter to the Council of Ministers.

16. In connection with each matter examined by the Committee a short protocol must be prepared, and signed at the same meeting by all members of the Committee who are present. Independently of the protocols detailed journals of the meetings will be kept and these will include the opinions of the Committee concerning the business under consideration. In case of a division of votes the protocol and the journal must contain the opinions both of the majority and the minority, together with a statement as to the Ministries which were included in each party.

17. The originals of journals and protocols will be kept with the documents of the Committee, but copies of the journals must be communicated within seven days to the Chiefs of Headquarters and to Chiefs of sections of those departments which are represented on the Committee.

18. The procedure to be followed in bringing matters before the Committee must be decided by the Committee and confirmed by the Minister of the Interior by agreement with other Ministers concerned.

19. The secretarial work in connection with the Committees shall be carried out by the secretary of the Committee, by his assistant, and by the officials allotted for the clerical work of the Committee.

20. The Secretary of the Committee shall be chosen by its President, whose choice must be confirmed by the Minister of the Interior. The appointment of the assistant secretary is confirmed by the President of the Committee. Only persons who have received a University education and who have a technical knowledge of radiotelegraphy and radiotelephony will be qualified to hold such posts.

C The following are the principal provisions of the Decree concerning wireless telegraphy in Russia of February 20th, 1908:—

By a “radiotelegraphic station” is understood every installation designated for telegraphic communications and capable of producing on the spot or receiving from a distance electro-magnetic waves.

Stations of this kind comprise:—

(1) Stations designated for a special use.

(2) Stations designated for a general use, that is to say, open to accept telegrams from the public.

The form of administration, working, and supervision of radiotelegraphic stations are regulated by the personnel of the Telegraph Service, except in the case of the special and supplementary provisions to be eventually fixed.

The establishment of radiotelegraphic stations for public use and the general management of the Radiotelegraphic Service of the Empire are under the jurisdiction of the General Direction of Posts and Telegraphs. The various Government departments, having established radiotelegraphic stations for their special use, inform the General Direction of Posts and Telegraphs before opening the service at the named stations of their destination, power, range, and technical construction.

The carrying out by scientific associations and schools of public instruction of scientific experiments and researches in radiotelegraphy is subject to an authorisation, by special request, of the Minister for the Interior. These experiments, as well as the working of radiotelegraph stations for purposes of instruction, can be interdicted in cases where such experiments and instructions would exercise a harmful influence on neighbouring radiotelegraphic stations, or, in general, prejudice the interests of others.

Stations on board ships anchored in ports, or sailing near the coasts, are subjected to special regulations decreed by the Minister for the Interior in common accord with the Ministers of War, of the Marine, of Ways and Communications, of Foreign Affairs and of Commerce and Industry.

ST. HELENA

THIS lonely little island, with an area of forty-seven square miles, in the South Atlantic lies about 800 miles from the nearest land (Ascension Island) and 1,200 miles from the West Coast of Africa. Its claim to fame rests upon the fact that it formed the place of exile of the great Napoleon.

St. Helena is an Admiralty coaling station and a resting place for the Eastern Telegraph Company's cable between Capetown and St. Vincent (Cape de Verdes). *Wireless Telegraphy* is administered under the following Ordinance and Regulations :—

A—Wireless Telegraphy Ordinance, 1912.

B—Regulations.

ORDINANCE.

A The following Ordinance provides for the regulation of wireless telegraphy :—

1. From and after the passing of this Ordinance the Governor-in-Council may make regulations as he may deem requisite for regulating the use of wireless telegraphy on merchant ships whether British or foreign while in the territorial waters of this Colony.

2. The Master of any ship and any person who shall act in contravention of any regulation now published or which may hereafter be published shall be liable on conviction to a penalty not exceeding ten pounds.

3. This Ordinance may be cited as "The Wireless Telegraphy Ordinance, 1912."

REGULATIONS.

B Made by the Governor-in-Council under Ordinance No. 7 of 1912, entitled "An Ordinance to provide for the Regulation of Wireless Telegraphy."

1. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of this Colony shall be worked in such a way as not to interfere with (a) naval signalling or (b) the working of any wireless telegraph station lawfully established, installed, or worked in the Colony or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used whilst such ship is in any of the harbours of this Colony except with the special or general permission of the Governor.

3. If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the territorial waters shall be subject to such further rules as may be made by the Governor from time to time, and such rules may prohibit or regulate such use in all cases as may be deemed desirable.

4. These Regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

SAINT LUCIA

See WINDWARD ISLANDS, under WEST INDIES (BRITISH), page 547.)

SAINT-VINCENT

See WINDWARD ISLANDS, under WEST INDIES (BRITISH), page 551.)

SAN SALVADOR (REPUBLIC OF)

THE independent Republic of San Salvador originated in the course of dissolution of the Central American Federation (Guatemala, Salvador, Honduras, Nicaragua, and Costa Rica), which took place in 1839. Its constitution dates from 1824 (during Federation days), and has been modified on various occasions ranging from 1859 to 1886. The President directs the Executive, whose legislative functions are exercised by a Congress annually elected under universal suffrage. The fourteen provinces, of which San Salvador is composed, possess a total area estimated at 13,176 square miles. The capital city possesses the same name as the Republic.

The Consular Report made by the United States Consul-General published on August 21st, 1911, contains the following clause:—

“Wireless stations have been installed at La Libertad and Lomas de Candelaria, the latter on a mountain ridge several miles from San Salvador, to which messages are now relayed by telegraph, although the ultimate plans embrace a station here as well. The tests having proved satisfactory, the Government will install an apparatus capable of maintaining communications with Bluefields (Nicaragua) and Limon (Costa Rica).”

The station at La Libertad was withdrawn as communication with ships at sea can easily be maintained by the installation now working at Lomas de Candelaria.

The prognostications of the U.S. Consul-General were fulfilled this year, and close by the city of San Salvador at a place known as *Finca Modelo* there was erected in May, 1917, a wireless station presented by Senor Carranza, the Mexican President.

At the time of going to press we were not in receipt of the text of any laws and regulations affecting radiotelegraphy in this Republic.

SANTO DOMINGO (DOMINICAN REPUBLIC)

THE island of Santo Domingo is divided between two States, the Western being the Republic of Hayti, the Eastern the Republic of Santo Domingo. French is the official language of the former, Spanish of the latter. The constitution of the Dominican Republic bears the date of November 18th, 1844. The President administers the Executive, the Legislative functions devolving on an International Congress with two Chambers. The United States landed troops in May, 1916, and is supervising the administration for the present. The twelve provinces of the Republic cover an area of 18,045 square miles.

The first land wireless station was erected at the capital city of San Domingo in 1908. The apparatus, supplied by the de Forest Company of New York, did not work satisfactorily, and despite the using of a power of 20 kw., only established irregular communication

with Puerto Rico. After a lapse of five years, a 2-kw. set was installed in September, 1913, and regular public communication was instituted with Puerto Rico. Over and above this publicly owned station, there is a station at La Romana (in the Province of Seybo), owned by the (Sugar Refining) Central Guanica Company in Puerto Rico. The latter relays to the British Cable Company in Puerto Rico, and thus touch is maintained with the outside world.

A small station belonging to the Republic was installed on April 13th, 1914, at San Pedro de Macoris, a town on the southern coast of Santo Domingo. This is utilised for communication with the station at Santo Domingo City, with the Central Romana station, and with ships approaching the port.

The authorities state that there are no further stations so far as is officially known (*oficialmente conocidas*), except one amateur experimental station in the Port of Azua on the southern coast of the island, owned by Senor Rafael Soto.

PUBLIC DEPARTMENTS CONTROLLING WIRELESS TELEGRAPH OPERATIONS.

Official.	Title.	Address.
Eduardo R. Soler ...	Postmaster-General ...	Santo Domingo.
Lieut. C. G. Baughman, U.S.N.	Secretary for Progress and Public Works	Public Works Office, Santo Domingo.
D. Samuel Goldstein	Station Superintendent ...	W.T. Station, Santo Domingo.
P. E. Littlefield ...	Chief Electrician ...	W.T. Station, Santo Domingo.
Daniel G. Marcos ...	Station Superintendent ...	W.T. Station, San Pedro de Macoris.

The only legislation on the subject of radiotelegraphy consists of a special law passed June 8th, 1911, and published in the *Official Gazette* No. 2207 of July 8th, 1911. This law exempts from taxation enterprises of public utility.

There is also in force a public contract with the Central Guanica and Central Romana (Sugar Refining) Companies, dated December 19th, 1913. This lays down the conditions under which the two companies conduct for the Dominican Government Public Radiotelegraphic Service through the medium of their stations.

Clause I. deals with the rates per word for foreign messages, which for the general public amounts to 30 cents per word.

Clause II. deals with radio rates in the island—8 cents per word.

Clause III. deals with special rates for officials of the States and the two companies, press rates, etc.

Clauses IV., V., and VI. deal with matters and methods of accountability.

SARAWAK

See BORNEO (British), page 186.

SEYCHELLES

THIS Colony consists of a group of islands belonging to Great Britain, almost in the middle of the Indian Ocean, and 600 miles north-east of Madagascar. Formerly associated with Mauritius, the colony of Seychelles was at one time administered from that island; but in 1888 a special administrator was created, and the occupant of the post in 1903 was raised to the rank of Governor.

The principal island is Mahé (52.5 square miles), and the Colony includes a number of dependent islands, which bring its total estimated area up to 156 square miles.

There are no private or commercial wireless installations, and radiotelegraphy is administered under the Ordinances, whose text will be found below, and which cancel "The Telegraphic and Electrical Stations Ordinance, 1903," printed in our former issues.

The list of current rules here included is as follows :—

A—Ordinance No. 3 of 1914.

B—Regulations (No. 52) thereunder.

C—Ordinance No. 11 of 1917.

D—Regulations (No. 127) thereunder.

ORDINANCE No. 3 OF 1914.

Dated February 19th, 1914.

Enacted by the Governor of the Colony of Seychelles with the advice and consent of the Legislative Council thereof.

A To provide for the regulation of wireless telegraphy.
Be it enacted by the Governor of the Colony of Seychelles with the advice and consent of the Legislative Council thereof, as follows :—

1. This Ordinance may be cited as "The Wireless Telegraphy Ordinance, 1914."

2. In this Ordinance and in any regulation made thereunder the expression "Wireless Telegraphy" means any system of communication by telegraph without the aid of any wire connecting the points from and at which the messages or other communications are sent and received : Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. The Governor may whenever he shall deem it expedient to do so licence the establishment of any wireless telegraph station or the installation or working of any apparatus for wireless telegraphy in any place in the Colony or on board any British ship registered in the Colony.

4. (1) No person shall establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place in the Colony or on board any British ship registered in the Colony except under and in accordance with a licence granted in that behalf by the Governor.

(2) Every such licence shall be in such form and for such period as the Governor in Executive Council may determine and shall contain such terms conditions and restrictions on and subject to which the licence is granted as the Governor shall consider desirable in the public interest.

5. (1) If any person establishes a wireless telegraph station without a licence in that behalf or instals or works any apparatus for wireless telegraphy without a licence in that behalf he shall be liable to a fine not exceeding two thousand Rupees (Rs. 2,000) or to imprisonment for a term not exceeding twelve months and in either case be

liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence but no proceedings shall be taken against any person under this Ordinance without the previous sanction of the Crown Prosecutor.

(2) If the Chief Justice or the Police Magistrate is satisfied by information on oath that there is reasonable ground for believing that a wireless telegraph station has been established without a licence in that behalf or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any ship within the jurisdiction without a licence in that behalf he may grant a search warrant to any Police Officer to enter and inspect the station place or ship and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

6. (1) The Governor in Executive Council may make regulations for all or any of the following matters :—

(i) for prescribing the form and manner in which applications for licences under this Ordinance are to be made ;

(ii) for prescribing the fees payable on the grant of any licence ;

(iii) for regulating the manner in which apparatus for wireless telegraphy on board a merchant ship whether British or foreign in the waters of the Colony shall be worked so as to prevent interference with naval signalling or the working of any wireless telegraph station lawfully established installed or worked in the Colony or the waters thereof and so as not to interrupt or interfere with the transmission of any wireless messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea ;

(iv) for prohibiting except with the special or general permission of the Postmaster of the Colony the working or using of any apparatus for wireless telegraphy on board a merchant ship whether British or foreign whilst such ship is in any of the harbours of the Colony ;

(v) for prohibiting or regulating in case at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy on board merchant ships whether British or foreign in the waters of the Colony the use of wireless telegraphy on board such ships while in such waters by such further rules as the Governor may see fit to make from time to time and either in all cases or in such cases as may be deemed desirable.

(2) Provided that no regulations made in respect of the matters described in paragraphs (iii) (iv) and (v) of this section shall apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

7. When an applicant for a licence proves to the satisfaction of the Governor that the sole object of obtaining the licence is to enable him to conduct experiments in wireless telegraphy a licence for that purpose shall be granted subject to such special terms, conditions and restrictions as the Governor may think proper but shall not be subject to any rent or royalty.

8. Every omission or neglect to comply with and every act done or attempted to be done contrary to the provisions of this Ordinance or of any regulations made thereunder or in breach of the conditions and restrictions subject to or upon which any licence has been issued shall be deemed to be an offence against this Ordinance and for every such offence not otherwise specially provided for the offender shall in addition to the forfeiture of any articles seized be liable to a fine of one thousand Rupees (Rs. 1,000).

9. Ordinance No. 4 of 1903 is hereby repealed.

B

REGULATIONS.

No. 52 of 1914.

1. Apparatus for wireless telegraphy on board a merchant ship shall not be worked or used while such ship is in any harbour or bay of the Colony except with the special or general permission of the Governor.

2. Apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the Colony shall not be worked in such a way as to interfere with—

(a) Naval signalling, or

(b) The working of any wireless telegraph station lawfully established, installed or worked in the Colony or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

3. In these regulations "Naval Signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and Naval Stations, or between a ship of His Majesty's Navy or a Naval Station and any other wireless telegraph station whether on shore or on any ship.

4. For the purpose of any proceedings under these regulations the master or person being or appearing to be in command or charge of any ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.

5. Any summons or other document in any proceedings under these regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in command or charge of the ship.

6. These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

7. Any person who shall offend against any of these regulations shall be liable to a fine not exceeding five hundred Rupees and any apparatus for wireless telegraphy in connection with which the offence was committed may be seized and forfeited.

Made by His Excellency the Governor in Executive Council at a meeting held on the 7th day of May, 1914.

ORDINANCE No. II of 1917.

AN ORDINANCE TO AMEND ORDINANCE No. 3 OF 1914.

C

Dated September 1st, 1917.

Be it enacted by the Governor of the Colony of Seychelles by and with the advice and consent of the Legislative Council thereof, as follows :—

1. This Ordinance may be cited as "The Wireless Telegraphy (Amendment) Ordinance, 1917," and shall be construed as one with the Wireless Telegraphy Ordinance, 1914.

2. Section 6 (iv) of the Wireless Telegraphy Ordinance, 1914, is hereby repealed and replaced by the following :—

(iv) For prohibiting except with the general or special permission of the Governor, the working or using of any apparatus for wireless telegraphy on board any ship, whether British or foreign other than His Majesty's ships of war, whilst such ship is in the waters of this Colony and for the control or disposal of any apparatus, instrument or thing which may be used in connection with wireless telegraphy on board any ship (other than His Majesty's ships of war) whilst such ship is in the waters of the Colony.

3. Section 6 (2) of the Wireless Telegraphy Ordinance, 1914, is hereby repealed.

4. (1) The Governor may appoint officers for the purpose of seeing that the provisions of the Wireless Telegraphy Ordinance, 1914, as amended by this Ordinance, and any regulations made thereunder are complied with and it shall be lawful for such officers to go on board any ship whether British or foreign whilst any such ship is at anchor in the waters of the Colony to see that such provisions are complied with.

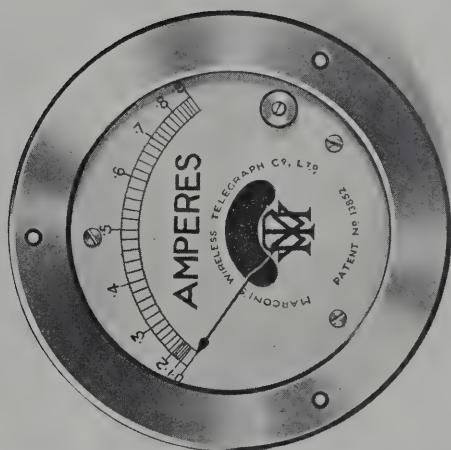
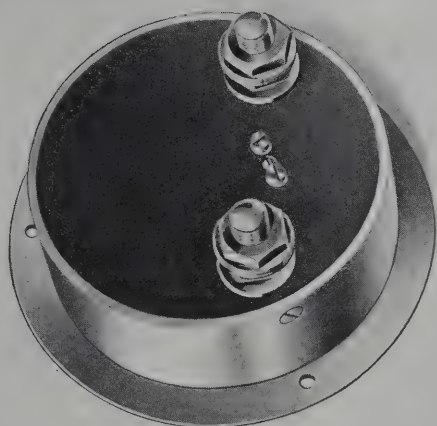
(2) If any such officer is molested, obstructed, hindered or insulted while in the execution of his duties an offence shall be deemed to have been committed.

5. For the purpose of any proceedings under the Wireless Telegraphy Ordinance, 1914, as amended by this Ordinance, or under any regulations made thereunder, the master or person being or appearing to be in command or charge of any ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship and for any breach of the Wireless Telegraphy Ordinance, 1914, as amended by this Ordinance, and any regulations made thereunder.

6. Any summons or other document in any proceedings under the Wireless Telegraphy Ordinance, 1914, as amended by this Ordinance, shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in command or charge of the ship.

7. The regulations published in *Gazette* No. 22 of 1914 under Government Notification No. 52 of 1914 are hereby repealed.

Passed in the Legislative Council at a meeting held on the 27th August, 1917



HOT-WIRE AMMETER, TYPE S.

D

REGULATIONS.

No. 127 of 1917.

1. The radiotelegraph station on board ships (other than His Majesty's ships of war) shall not be worked whilst such ships are within any harbour or bay of the Colony.

2. For the proper enforcement of section 1 of these regulations ships of British register in any harbour or bay of the Colony must completely disconnect their aerial wires from their radio apparatus, the ends of such wires being suspended entirely clear of the radiotelegraph cabin, preferably from the main rigging, in such a manner as to show they are properly disconnected.

3. (1) Ships of foreign register in any harbour or bay of this Colony must, subject to the provisions of sub-section 2 of this section, take down their aerial wires completely and disconnect the same from their radiotelegraph apparatus.

(2) Ships of foreign register remaining in a harbour or bay of this Colony for less than twelve hours may, at the discretion of the Governor, be permitted to leave their aerials up, provided the same are disconnected in accordance with the provisions of section 2 of these regulations.

4. Any officer appointed under the provisions of section 4 of Ordinance No. 11 of 1917 may order that the radiotelegraph cabin on board any ship (other than His Majesty's ships of war) be sealed and he shall thereupon affix his seal to such cabin.

If any seal so affixed is removed or tampered with an offence shall be deemed to have been committed against these regulations.

Made by His Excellency the Governor in Executive Council at a meeting held on the 24th day of September, 1917.

SIAM

THE Kingdom known to us as Siam, to the natives as Muang Ti, lies between British Burma and French Indo-China. Its integrity is guaranteed by France and Great Britain under mutual agreement. The form of government is an absolute monarchy with an Executive Council of Ministers and an European Adviser.

The total area of Siam (inclusive of all the islands) measures about 240,000 English square miles. The coast line of Siam extends approximately over 2,000 miles, and geographically Siam lies between 5° 40' and 20° 20' N. latitude, and between 97° 5' and 105° 0' E. longitude. The greatest distance east to west is estimated at about 510 miles, and that from north to south about 1,005 miles. There are 3,000 miles of wired telegraph lines.

Originally radio-telegraphy was organised in Siam under supervision of the Minister of Marine. The first stations erected were those at Saladeng in Bangkok (lat. 13° 44' 32.49" N., long. 100° 29' 22.30" E.), and secondly in Songkhla (lat. 7° 10' 0" N., long. 100° 36' 12" E.); both of these land stations directly controlled by Government.

There are experimental, amateur, and instructional stations at Saladeng. There are also ship stations on Government vessels.

NAVAL DEPARTMENT CONTROLLING WIRELESS TELEGRAPH OPERATIONS.

Official.	Title.
Lieut.-Commander Luang Nava Vichitr ...	Head of Radiotelegraphic Department.
Lieut.-Commander Luang Nava Vichitr ...	Chief Engineer Wireless Station.
Lieut. Phin	} Principal Assistants.
Lieut. Pheh	
Lieut. Chatra	

The laws and regulations under which radio-telegraphy is administered in Siam will be found below.

RADIO-TELEGRAPH LAW.

This Law may be cited as "The Radio-Telegraph Law, B.E. 2457." (1914.)

2. It shall come into force from the date of its publication in the Government Gazette.

COAST AND LAND STATIONS.

3. The right to establish and work radio-stations for telegraphic and telephonic purposes on Simese soil and on board ships permanently anchored in Siamese territorial waters is an exclusive privilege of the Government.

This privilege shall be reserved to the Department of Posts and Telegraphs in the Ministry of Communications.

4. The Army and Navy may establish and work independently radio-telegraph stations or field apparatus subject to such conditions as may be from time to time sanctioned in writing by the Minister of War or Marine.

Any station established under this section may be opened to public correspondence only under special arrangement with the Department of Posts and Telegraphs.

SHIP STATIONS.

5. No merchant ship under the Siamese flag shall establish or work any radio-telegraph or telephone apparatus without a licence from the Minister of Communications.

The Minister of Communications shall not grant such licence until he has been satisfied that the apparatus can work in accordance with the provisions of the International Radio-Telegraph Convention of London, 5th July, 1912, and will be handled by qualified operators.

Such licence shall be for such time and subject to such conditions as the Minister of Communications may deem good.

6. No ship, whether under the Siamese or a foreign flag, excepting ships of war, is allowed while in Siamese territorial waters to send a message by means of her radio-telegraph apparatus when and where such message can be forwarded by the Government system, either with or without wires, except for the purpose of transmitting messages to or from a ship in distress.

SECRECY.

7. No person or persons engaged in or having knowledge of the operation of any radio-station shall disclose the contents of any message transmitted or received by such station for the purpose of transmission, except to the person to whom the same may be directed or his authorised agent, or to another station employed to forward such message to its destination, or in obedience to the directions of a Court of competent jurisdiction.

PENALTIES.

8. Whoever establishes or works any apparatus contrary to the provision of Section 3 and 6, or in excess of the conditions laid down under Section 4 of this Law, shall be punished with imprisonment not exceeding six months or fine not exceeding five hundred ticals or both.

The captain or master of a ship, and the person directly responsible for the offence, if any, shall both be liable to punishment for every infringement of the provisions of Section 6.

9. Any person infringing Section 5 of this law shall be punished with fine not exceeding one hundred ticals.

10. Upon the conviction of any person of an offence under the foregoing sections, the Court may order the forfeiture of any apparatus used for the commission of such offence.

11. Any person injuring apparatus or committing any act of mischief to a radio-telegraph station lawfully established, or doing anything to prevent or intended to prevent the transmission or delivery of any radio-telegraph message by any such station, shall be guilty of an offence under Section 196 of the Penal Code.

12. Whoever commits any offence against Section 7 of this Law shall be punished under Section 279 to 281 of the Penal Code.

EXECUTION.

13. The Minister of Communications shall have charge and control of the execution of this Law.

It shall be lawful for him to frame regulations and to fix the scale of fees for land, coast, and ship charges in the transmission of messages by radio-telegraphy or telephony, as well as for licences under Section 5.

It shall also be lawful for him to frame regulations about the qualifications required from operators.

All such regulations shall be in accordance with the detailed Service Regulations appended to the International Radio-Telegraph Convention.

Such regulations, on being sanctioned by His Majesty and published in the Government Gazette, shall be deemed to be part of this Law.

Given on the 24th day of April, B.E., 2,457 (1914), being the 1,261st day of the Present Reign.

SIERRA LEONE

SIERRA LEONE proper consists of a peninsula about 26 miles long and 12 miles broad, covering an area of about 300 square miles. The Colony, however, is much more extensive, stretching from French Guinea on the north to the Republic of Liberia on the east and south-east; its total area being 4,000 square miles.

The capital is Freetown, and the Colonial administration is conducted by a Governor and Commander-in-Chief, assisted by Executive and Legislative Councils. The same officials also administer the "Protectorate," a term which applies to the territories, not being portions of the Colony of Sierra Leone, lying between 6° and 10° north latitude and 10° and 14° of west longitude.

The regulation of wireless telegraphy rests solely in the hands of the Government. There are no *private wireless stations* and no *wireless clubs or societies*.

The Sierra Leone wireless laws and regulations were first formulated in the Decree of 1903, and the Schedule founded thereon. In 1912 this Decree and the regulations in the Schedule were amended by Ordinance No. 19 with the Schedule which was thereto attached. In the following year (1913) these were in their turn replaced by Ordinance No. 11 with its accompanying Schedule, both of which we print below. An additional set of Regulations was issued on July 16th, 1917, and the text thereof will be found in our pages.

The list of reprints included here cover :—

- A—Ordinance No. 11 of 1913.
- B—Schedule dated May 23rd, 1913.
- C—Regulation No. 7 of 1917.

AN ORDINANCE TO PROVIDE FOR THE REGULATION OF WIRELESS TELEGRAPHY.

No. 11 of 1913.

A BE IT ENACTED by the Governor of the Colony of Sierra Leone, with the advice and consent of the Legislative Council thereof as follows :—

1. *Short Title*.—This Ordinance may be cited as the Wireless Telegraphy Ordinance, 1913.

2. *Definition of "Wireless Telegraphy"*.—In this Ordinance, "Wireless Telegraphy" means any system of communication by telegraph without the aid of any wire connecting the points from and at which the messages or other communications are sent or received : Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. *Licence for Wireless Telegraphy*.—(1) A person shall not establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place or on board any ship registered in the colony, except under and in accordance with a licence granted in that behalf by the Governor.

(2) Every such licence shall be in such form and for such period as the Governor may determine, and shall contain the terms, conditions and restrictions on and subject to which it is granted.

4. *Apparatus aboard ships to be worked in accordance with regulations*.—A person shall not work any apparatus for wireless telegraphy installed on any merchant ship, whether British or Foreign, while that ship is in the territorial waters of the Colony, otherwise than in accordance with regulations under this Ordinance.

5. *Regulations*.—(1) The Governor may from time to time make regulations for carrying into effect the purposes of this Ordinance.

(2) *Schedule*.—The regulations in the Schedule to this Ordinance shall have effect except in so far as they may be amended or rescinded by regulations made under the authority of this section.

(3) If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the territorial waters of the colony shall be subject to such further regulations as may be made by the Governor from time to time, and such regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

6. *Search Warrant*.—If a Magistrate is satisfied by information on oath that there is reasonable ground for suspecting that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship without a licence in that behalf or contrary to the provisions of any regulations made under this Ordinance or of any licence granted under this Ordinance, he may grant a search warrant to any superior Officer of Police named in the warrant, and a warrant so granted shall authorise the Officer to enter and inspect the station, place, or ship, and to seize any apparatus which appears to be used or intended to be used for wireless telegraphy therein.

7. *Penalties*.—Any person who shall offend against any provision of this Ordinance or any of the regulations made thereunder shall be liable on summary conviction for every such offence to a fine not exceeding fifty pounds, and upon such conviction the Court may order that any apparatus for wireless telegraphy in connection with which the offence was committed shall be seized and forfeited.

8. *Repeal No. 22 of 1903, No. 19 of 1912*.—The Wireless Telegraphy Ordinance, 1903, and the Wireless Telegraphy Amendment Ordinance, 1912, are hereby repealed.

SCHEDULE—SECTION 5 (2).

REGULATIONS.

B 1. All apparatus for Wireless Telegraphy on board a merchant ship in the territorial waters of the Colony shall be worked in such a way as not to interfere with

(a) Naval Signalling, or

(b) the working of any wireless telegraph station lawfully established, installed or worked in the Colony or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. In these Regulations, 'Naval Signalling' means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Naval Stations or between a ship of H.M. Navy or a Naval Station and any other wireless telegraph station whether on shore or on any ship.

3. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used while such ship is in any harbour or bay of the Colony except with the special or general permission of the Governor.

4. For the purpose of any proceedings under these regulations the master or person being or appearing to be in command or charge of any ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.

5. Any summons or other document in any proceedings under these regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in command or charge of the ship.

6. These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

Passed in the Legislative Council this Twenty-third day of May in the year of our Lord, One thousand nine hundred and thirteen.

REGULATIONS (No. 7 OF 1917) MADE UNDER SUB-SECTION (1) OF SECTION 5 OF THE WIRELESS TELEGRAPHY ORDINANCE, 1913 (No. 11 OF 1913).

C Whereas by sub-section (1) of section 5 of the Wireless Telegraphy Ordinance, 1913 (No. 11 of 1913), it is provided that the Governor may from time to time make regulations for carrying into effect the purposes of the Ordinance :

And whereas by sub-section (2) of section 5 it is provided that the regulations made and passed by the Legislative Council, 23rd day of May, 1913, shall have effect except in so far as they shall be amended or rescinded by regulations made under the authority of the section :—

Now, therefore, under and by virtue of the power and authority in that behalf vested in me, it is hereby ordered that the regulations contained in the Schedule to the Ordinance shall and are hereby amended as follows :—

1. Regulation (iii) is hereby rescinded and the following substituted therefor :—

(iii) (a) No apparatus for wireless telegraphy on board ships (other than His Majesty's ships of war and ships to which a special or general licence has been granted by the Governor) shall be worked whilst such ships are within any harbour (or bay) of the Colony.

(b) For the proper enforcement of the above, ships of British register in any harbour (or bay) of the Colony must completely disconnect their aerial wires from their wireless telegraph apparatus, the ends of such wires being suspended entirely clear of the wireless telegraph cabin, preferably from the main rigging, in such manner as to show they are properly disconnected.

(c) Ships of foreign register in any harbour (or bay) of the Colony must, subject to the provisions of the following sub-section (d), take down their aerial wires completely and disconnect the same from their wireless telegraph apparatus.

(d) Ships of foreign register remaining in a harbour (or bay) of the Colony for less than twelve hours may, at the discretion of the competent naval authority, be permitted to have their aerial

wires up provided the same are disconnected in accordance with the provisions of sub-section (b) of this regulation.

(e) The operating cabin may be sealed or any other steps taken at the discretion of the local authorities.

2. Regulation 6 is hereby rescinded.

Made this 16th day of July, 1917.

SINGAPORE

(See STRAITS SETTLEMENTS, page 479.)

SOMALILAND (PROTECTORATE OF)

THE Somali coast, lying south of the Red Sea, and stretching from Lahadu to Bandar Ziyava (49° east longitude), is administered by a British Commissioner. Egyptian control ceased in 1884, and the territory then fell under the administration of the Indian Government. It was taken over by the Foreign Office on October 1st, 1898, and was transferred to the Colonial Office on April 1st, 1905. The area comprises about 68,000 square miles, which support a population of about 300,000 Mohammedans, mainly nomadic, except on the coast where British occupation has brought into existence some fair-sized towns supporting an urban population. The boundary has been settled by agreement between France, Italy, and King Menelik of Abyssinia. The chief ports are Berbera, Bulhar, and Zeyla.

Originally radiotelegraphy was introduced, and the Protectorate was placed in telegraphic communication with the outside world, more with a view to administrative than commercial purposes. The first stations were erected in 1910 at Berbera and Aden, the latter being in telegraphic communication with the Eastern Telegraph Companies at Aden Station. Subsequently two other stations were erected—one at Bulhar (1913), the other at Burao (1916).

The latest available statistics enumerate: Four land stations (fixed) directly controlled by Government, one portable land station also under Government control.

The control of wireless telegraph operations is vested in the Posts and Telegraph Department, and we annex hereto a list of the principal officials:—

PUBLIC DEPARTMENT CONTROLLING WIRELESS TELEGRAPH OPERATIONS, POSTS AND TELEGRAPH DEPARTMENT.

Official.	Title.	Address.
J. C. Hawkhead ..	Director, Posts and Telegraphs ..	Berbera.
P. Hey ..	Assistant Director of Posts and Telegraphs ..	Berbera.
A. J. S. Culpeper ..	Chief Operator ..	Berbera.

The first Ordinance to regulate radiotelegraphy in the Somaliland Protectorate was passed in 1908. It was called Ordinance No. 6 of 1908, and enacted that the full control of radiotelegraphy should be vested in the Commissioner, and any person contravening his regulations should be liable on conviction to a fine not exceeding £100 or imprisonment for 12 months, together with confiscation of his apparatus. A new Ordinance repealing the above was passed in 1913, and appears *in extenso* below. This constitutes the extant governing decree under

which wireless is at present administered. A further Official Notice was issued on June 1st, 1917, which is reprinted verbatim below.

We append the text of the following :—

A—Wireless Telegraphy Ordinance, 1913.

B—Regulations thereunder.

C—Official Notice of June 1st, 1917.

ORDINANCE.

A 1. This Ordinance may be cited as “The Wireless Telegraphy Ordinance, 1913.”

2. In this Ordinance “Wireless Telegraphy” means any system of communication by telegraph without the aid of any wire connecting the points from and at which messages or other communications are sent or received. Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. (1) A person shall not establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place or on board any ship registered in the Protectorate, except under and in accordance with a licence granted in that behalf by the Commissioner.

(2) Every such licence shall be in such form and for such period as the Commissioner may determine, and shall contain the terms, conditions and restrictions on and subject to which it is granted.

4. A person shall not work any apparatus for wireless telegraphy installed on any merchant ship, whether British or foreign, while that ship is in the territorial waters of the Protectorate, otherwise than in accordance with regulations under this Ordinance.

5. (1) The Commissioner may from time to time make regulations for carrying into effect the purposes of this Ordinance, and such regulations shall on publication have the same effect as if enacted in this Ordinance.

(2) The regulations in the Schedule to this Ordinance shall have effect in so far as they may be amended or rescinded by regulations made under the authority of this section.

(3) If at any time, in the opinion of the Commissioner, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the territorial waters of the Protectorate shall be subject to such further regulations as may be made by the Commissioner from time to time, and such regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

6. If a Magistrate is satisfied by information on oath that there is reasonable ground for suspecting that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship without a licence in that behalf or contrary to the provisions of any regulations made under this Ordinance, or of any licence granted under this Ordinance, he may grant a search warrant to any Police Officer or any person appointed in that behalf

by the District Commissioner and named in the warrant, and a warrant so granted shall authorise the Police Officer or person named therein to enter and inspect the station, place or ship, and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

7. (1)* Any person who shall offend against any provision of this Ordinance or any of the regulations made thereunder shall be liable on summary conviction for every such offence to a fine not exceeding rupees seven hundred and fifty, and upon such conviction the Court may order that any apparatus for wireless telegraphy in connection with which the offence was committed shall be seized and forfeited.

(2) Proceedings shall be taken before the District Court, and the procedure shall be the same as the procedure for the time being in force in respect of offences punishable on summary conviction.

8. The Wireless Telegraphs Ordinance, 1908, is hereby repealed.

SCHEDULE.—SECTION 5 (2).

REGULATIONS.

B i. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the Protectorate shall be worked in such a way as not to interfere with—

(a) Naval signalling, or

(b) The working of any wireless telegraph station lawfully established, installed or worked in the Protectorate or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless stations established on ships at sea.

ii. In these regulations “Naval Signalling” means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty’s Navy, between ships of His Majesty’s Navy and Naval Stations, or between a ship of His Majesty’s Navy or a Naval Station and any other wireless telegraph station whether on shore or on any ship.

iii. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used while such ship is in any harbour or bay of the Protectorate, except with the special or general permission of the Commissioner.

iv. For the purpose of any proceedings under these regulations the master or person being or appearing to be in command or charge of any ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.

v. Any summons or other document in any proceedings under these regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in command or charge of the ship.

vi. These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

OFFICIAL NOTICE DATED JUNE 1ST, 1917.

C On June 1st, 1917, the following notice was issued by His Majesty's Commissioner:—

"In exercise of the powers conferred upon me by 'The Wireless Telegraph Ordinance, 1913,' No. 4 of 1913, I hereby direct that the following additional rules shall be observed for the better carrying into effect of the provisions of the said Ordinance. Operation of ship stations within the territorial waters of the Somaliland Protectorate.

"(a) The radiotelegraph stations on board ships (other than His Majesty's ships of War or British Government vessels) shall not be worked whilst such ships are within the territorial waters of the Protectorate.

"(b) For the proper enforcement of the above, ships of British register in the territorial waters of the Protectorate must completely disconnect their aerial wires from their radio apparatus, the ends of such wires being suspended entirely clear of the radiotelegraph cabin, preferably from the main rigging, in such a manner as to show they are properly disconnected.

"(c) Ships of foreign register in the territorial waters of the Protectorate must subject to the provisions of the following sub-section,

"(d) Take down their aerial wires completely and disconnect the same from their radiotelegraph apparatus.

"(e) Ships of foreign register remaining in the territorial waters of the Protectorate for less than twelve hours may, at the discretion of the competent authority, be permitted to leave their aerials up, provided the same are disconnected in accordance with the provisions of sub-section (d) of this regulation."

SOUTH AFRICA (UNION OF)

THE Union of South Africa lies between 22° and 34° 50' south latitude and 16° 30' and 32° 40' east longitude. Its total superficial area, not including the Protectorates of Bechuanaland, Basutoland, and Swaziland, which are included within the same geographical boundaries, but do not form part of the Union, is 473,075 square miles. The coast line extends from the mouth of the Orange River on the west coast to a point in latitude south 26° 30' on the east coast, and measures about 1,725 miles. The greatest distance east to west is a little under 900 miles, and north to south a little over 1,800 miles. At the last census, taken in 1911, the population was 1,276,242 Europeans, 4,019,006 natives, and 678,146 other coloured races. The Union was constituted on May 31st, 1910, under the South Africa Act of 1909, and embraces the former separate self-governing colonies of the Cape of Good Hope, the Transvaal, the Orange Free State, and Natal.

The Executive Government is vested in a Governor-General appointed by the Crown, aided by an Executive Council of Union Ministers, with two Houses of Legislature.

The administration of radiotelegraphy is in the hands of the Postmaster-General.

For Colonies working under the direction of the High Commissioner of South Africa (e.g., Basutoland, etc.)—see under their own names.

CHIEF OFFICIALS OF THE UNION DEPARTMENT OF POSTS AND TELEGRAPHS.

Postmaster-General, J. Wilson.

Secretary, H. Twycross.

Engineer-in-Chief, N. Harrison.

Controller of Stores, W. Hopkins.

General Traffic Superintendent (Telegraphs), J. H. Weaver.

General Traffic Superintendent (Telephones), J. A. Dingwall.

There are two wireless stations in South Africa, under the control of the Union Government. The first was established at Durban in June, 1910, and the second at Slangkop, near Capetown, in May, 1911. Both of these stations send out daily weather reports and forecasts as well as a daily time signal. In September, 1913, it became necessary in connection with the port defences to remove the Durban station from the position where it had been originally erected to a point some four miles distant. The change of situation has not adversely affected its efficiency.

There are no privately owned stations, and amateur installations are prohibited.

The latest available statistics are as follows :—

- (1) Land stations controlled by Government, 2.
- (2) Land stations privately owned, nil.
- (3) Land stations (experimental stations), nil.
- (4) Land stations (amateur and instructional), prohibited during the war.
- (5) Ship stations on Union Government vessels, nil.
- (6) Ship stations on privately owned vessels, 1 low power.

The only statutory regulation on radiotelegraphy within the Union is that contained in the preamble to the Post Office Act, and Section 80, *ibid*, both of which will be found below.

No licences in terms of the section of the P.O. Act of 1911 are being issued during the present war, and there are no private licensees for radiotelegraphy in existence except one in respect of the S.S. South Africa. The licence follows the same lines as that issued in Great Britain.

There is no Union Act compelling ships trading in South African waters to be fitted with radiotelegraphic apparatus.

A—Statutory Regulation (Preamble to P.O. Act, 1911).

B—Section 80 of Post Office Act, 1911.

POST OFFICE ADMINISTRATION AND SHIPPING COMBINATION DISCOURAGEMENT ACT, 1911.

CHAPTER V.—SECTION I.

A In this Act, unless inconsistent with the context, "telegraph" shall include "telephone," and shall mean any system or means of conveying signs, signals, sounds, or

communications, by the agency of electricity, magnetism, electro-magnetism, or by any agency of a like nature, whether with or without the aid of wires, and shall include the system commonly known as wireless telegraphy, or ætheric signalling, and any improvements or developments of that system.

“Telegraph line” shall include any apparatus, instrument pole, mast, standard, wire, pipe, tunnel, pneumatic or other tube, thing, or means whatever, which is or may be used in connection with or for the purpose of sending, transmitting, conveying, or receiving telegraphic signs, signals, sounds, or communications.

1. The Postmaster-General shall have the exclusive privilege of constructing and maintaining telegraph lines and of transmitting telegrams or other communications by telegraph within the Union or the territorial waters thereof, and of performing all the incidental services of receiving, collecting, or delivering telegrams or other such communications: Provided that—

(a) the owners of any system of railways may maintain and work for the purposes of any such railway, for the time and to the extent authorised by any law, any telegraph lines constructed in pursuance of rights conferred by that law; and

(b) the Postmaster-General may construct, maintain, or lease telegraph lines for private use or may, by licence, authorise any person to construct, maintain, and work private telegraph lines within the Union or its territorial waters and may prescribe the fees and conditions therefor.

POST OFFICE ADMINISTRATION ACT, 1911.

B 80. (1) The Postmaster-General shall have the exclusive privilege of constructing and maintaining telegraph lines and of transmitting telegrams or other communications by telegraph within the Union or the territorial waters thereof and of performing all the incidental services of receiving, collecting, or delivering telegrams or other such communications: Provided that—

(a) the owners of any system of railways may maintain and work for the purpose of any such railway, for the time and to the extent authorised by any law, any telegraph lines constructed in pursuance of rights conferred by that law; and

(b) the Postmaster-General may construct, maintain or lease telegraph lines for private use or may, by licence, authorise any person to construct, maintain and work private telegraph lines within the Union or its territorial waters and may prescribe the fees and conditions therefor.

(2) No telegraph line shall be used for the purpose of transmitting or delivering telegrams for the public except by the authority of the Postmaster-General and upon such terms and conditions as he may prescribe, and the department shall have the right, by means of its officers, of inspecting all offices which are authorised to accept, transmit, or deliver public telegrams.

SPAIN

THE present Constitution of Spain after having been drawn up by the Government and laid before a *Cortes Constituyentes* elected for its ratification, on March 27th, 1876, was proclaimed on June 30th of that year. It enacts that Spain shall be a Constitutional Monarchy, the Executive vested in the King, and the power to make laws "in the Cortes with the King." The reigning monarch, Alphonso XIII., belongs to the House of Bourbon, who succeeded to the Spanish throne at the end of the seventeenth century. He married Princess Victoria Eugenie, granddaughter of our own Queen Empress Victoria, on May 31st, 1906.

Radiotelegraphy has from its initiation in practice, attracted much attention and interest in the Iberian Peninsular.

As early as 1899 commissions were appointed in Spain which, from time to time, issued reports to their Government on the subject of Wireless Telegraphy. As a result, a Royal Decree of May 21st, 1905, appointed a permanent commission, presided over by the Chief of the General Staff and including representatives of the War Office, Admiralty and Home Office, thus anticipating the first International Conference concerning Wireless Telegraphy—i.e., the one held in Berlin, 1906 (subsequently modified by the London International Convention of 1912).

Spain is one of the signatories of the important "Safety of Life at Sea" Convention and has become a party to all the international agreements affecting Radiotelegraphy. She has, moreover, passed separate laws and regulations framed with the object of establishing and developing this applied science in the home country and in her dependencies.

In the course of 1917 an important Royal Order was published by the Ministry of Marine, enacting that every merchant vessel of 500 tons and over must instal wireless telegraphy. The text of this Order will be found below, together with the following current Rules and Regulations.

A—Law of October 26th, 1907.

B—General Rules, January 24th, 1908.

C—Regulations, January 24th, 1908.

D—Royal Order of September 4th, 1914.

E—Royal Decree dated February 20th, 1917.

F—Royal Order of June 22nd, 1917.

G—Decree dated October 12th, 1917.

LAW OF OCTOBER 26TH, 1907.

THE GOVERNMENT OF SPAIN IS HEREBY AUTHORISED TO ESTABLISH AND DEVELOP THE WIRELESS, CABLE AND TELEPHONE SERVICES.

H.M. Don Alfonso XIII. by the grace of God and by the
A Constitution, makes it known by these presents that Parliament has decreed and he, the King, has given his Royal assent to the following :—

ART. I.—The Government is hereby authorised to establish and develop the wireless, cable and telephone services—availing itself of the co-operation of national institutions—by means of a Royal Order which will be published within four months from the promulgation of this law.

ART. 2.—The expenses entailed by each service will be covered by the takings of the concession itself. In the case of certain concessions, the proviso is reserved that the establishment may be taken over by the State in whole or part, by Royal Decree, should the so doing be considered as in the national interests.

ART. 3.—Concessions regarding these new services will be granted by public tender, and all necessary conditions must be fulfilled in order to safeguard the interests and security of the nation.

It is therefore decreed :

That all tribunals, magistrates, prefects, governors and all persons in authority, whether civil, military or ecclesiastical, whatever their rank and dignity, must obey and see to it that this law is observed in all its parts.

Given at the Royal Palace on October 26th, 1907.

GENERAL RULES.

PROMULGATED BY ROYAL DECREE AS THE BASIS FOR THE ESTABLISHING OF WIRELESS SERVICE IN SPAIN.

ART. 1.—The establishing and exploitation of all systems and **B** apparatus available for the so-called "Hertzian telegraphy," "etherial telegraphy," and "radiotelegraphy," and all similar processes already invented or which may be invented in the future, shall be considered as included among the State monopolies regarding all means of electrical communications.

ART. 2.—The establishing and exploitation of the above telegraphic systems shall be controlled by (1) the Minister of the Interior in all matters appertaining to the general civil applications of the said systems, and (2) by the Ministers of War and Marine when and where those applications are specially connected with national defence and with the army and navy.

ART. 3.—All other official departments requiring a radiotelegraphic service can erect wireless installations by previous agreement with the Minister of the Interior. Such installations will be under the regulations established for the regular wireless service and wireless experiments.

ART. 4.—No experiments with the above-mentioned systems can be instituted in the Peninsula, or in the Balearic and Canary Islands, or in Spain's African possessions, without the authority of the Ministers of War, Marine or Interior, according to the kind of experiment which it may be proposed to carry out. Such experiments and trials shall be carried out under the official inspection of the respective departments responsible, excepting only those of a technical character carried out by the personnel of the scientific institutions of the State. These shall be independent of the said departments, providing they adhere to the regulations laid down.

ART. 5.—The Minister on whose authority the above installations and experiments are established and effected must give notice thereof to the other Ministers, giving them also full particulars regarding their service and conditions.

ART. 6.—Acting in agreement with the Ministers of War and Marine, in the cases herein aforesaid, and acting independently in all other cases, the Minister of the Interior can authorise the installation of wireless stations, provided that none have been officially installed, when the said installations may have been applied for by individuals, societies, corporations or national institutions, subject to the following rules :—

(1) The applicant shall address himself in the first instance to the Minister of the Interior, stating clearly the place where the installation is to be erected, and supplying a plan of the building, together with the conditions and advantages of the locality.

(2) Such installations and the services they are expected to render shall be subject to the special rules and conditions laid down in each case, and to the general regulations established by the State for its own installations and wireless service.

(3) The Government shall have the right to close the service under extraordinary circumstances affecting the safety of the State and the maintenance of public order.

(4) The Government shall also have the right to acquire by purchase, whenever it may be considered convenient, and with the previous payment of an indemnity, the wireless installations hereinbefore mentioned, and the valuation for such compensation shall take into consideration the actual condition of the material and of the installation itself.

(5) The concessionnaire shall let the Minister of the Interior know, in good time, the date on which the station or stations will start working, in order to allow the personnel of the telegraph office the necessary time for their inspection.

(6) The petitioner must not consider himself entitled to proceed with the work of installation until the necessary authorisation has been granted.

The following rules were added by Decree of July 19th, 1914.

(7) If the stations are to be fitted up merely for the reception of messages and for scientific purposes, or to serve as auxiliaries to meteorological observatories, authorisation for the same can be obtained from the Minister of the Interior, provided that the application be made by an Official Institution, or by a private individual acting with the support of an Official Department.

(8) These receiving stations must be inspected by the Director of Telegraphs of the locality where they are installed.

(9) The persons appointed to carry out the reception must take an oath before the Civil Governor of the Province, to keep secret all information they may gather from the radiotelegraphic messages.

ART. 7.—The ships belonging to the national mercantile marine can instal on board wireless stations worked on any of the wireless systems in current use, provided they obtain a special permit to do so from the Minister of Marine, who will grant it in accordance with the conditions established by the International Agreement and Service Regulations adopted in Berlin on November 3rd, 1906.

ART. 8.—Permits to establish wireless installations will not be granted to any private individual, society, or corporation, belonging to a foreign nationality.

ART. 9.—Any person or persons exploiting or using clandestinely any system of wireless, or any person or persons attempting to conduct wireless experiments with apparatus available for the purpose, will be prosecuted in conformity with the penal Code, the general law, the military orders, or the administrative regulations, as the case may be. Prosecution for these offences will be carried out by the authorities entrusted with the administration of the said laws, orders and regulations; and the State will confiscate all material employed for such purposes.

ART. 10.—By agreement between the Ministers of War, Marine and Interior, the wireless stations which may be considered necessary and convenient for commerce, navigation and national defence will be erected on the sea board of the Iberian Peninsula, on the Balearic and Canary Islands, and in the African possessions of Spain.

These installations will be under the control of the aforesaid three Ministers, as the case may be, both in the matter of supplies and of personnel and offices, and they will form a part of the national telegraphic system.

This linking up of the wireless with the land telegraphic service will be effected by the ministerial department controlling the various wireless installations.

ART. 11.—Authorisation is hereby given for the interchange of messages between ships belonging to the national mercantile marine and those belonging to foreign nations carrying wireless installations of current systems, and also for the interchange of messages between the said ships and the coast stations already established or to be established by the Ministry of the Interior on the sea board of the Peninsula, on the Balearic and Canary Islands, and in the Spanish possessions in Africa.

The Minister of the Interior shall determine the date of the inauguration, the extension and the class of service of each station.

ART. 12.—The Government shall have the option of refusing or accepting those wireless systems the details of which have not been made public.

ART. 13.—The State accepts no responsibility for the wireless service. In the cases of errors or of non-delivery of radiotelegrams the procedure followed will be as established in Art. 35 of the Berlin regulations.

ART. 14.—Whatever the object of the installations, the wireless service shall be organised, whenever possible, in such way as not to disturb other services of the same kind, or class. The ministerial departments interested shall adopt in each case such rules and regulations as may be found necessary, and shall also arrange regulations with other States regarding frontier installations.

ART. 15.—All wireless services, whether public, official, or private, carried on through the intermediary of land, coast and ship stations, shall be subject to the regulations hereunto attached.

ART. 16.—In addition to the rules herein contained, and those of the regulations mentioned in the previous article, the provisions affecting Radiotelegraphy contained in the International Convention made in Berlin on November 3rd, 1906, together with the Service Regulations appended thereto, must be observed.

ART. 17.—The Director-General of Posts and Telegraphs shall see to the fulfilment of the stipulations made by Art. 13 of the International Agreement and of those made by Art. 37 of the Berlin regulations, regarding the International Bureau established in Switzerland. The Ministers of War and Marine shall in accordance thereunto furnish the data required, which must be in the possession of the naval and military installations and stations, and also data affecting the merchant ship stations, whose installations are authorised by the Minister of Marine.

ART. 18.—Messages received from or transmitted directly to a country or ship registered in a country which is not a signatory of the convention and regulations of Berlin, can only be admitted through the Spanish telegraphic system and through the coast wireless stations after a declaration has been made by the country in question expressing an intention of applying the rules laid down by the said convention, and their regulations regarding the regular routine of the messages and the security of the accounts. In their radiotelegraphic service the coast stations shall give preference to the service of those countries which have become parties to the international agreements.

Articles 19 to 34 and the additional articles appended thereto deal with wireless installations on fortresses.

REGULATIONS.

GOVERNING THE WORKING OF THE WIRELESS STATIONS IN SPAIN.

GENERAL SERVICE.

C ART. 1.—All persons are allowed to make use of the wireless service, but the Government reserve to themselves the privilege of suspending for an indefinite period, as they may judge convenient, either every class of communication or such communications as belong to some particular class, or communications which affect some special station or stations.

ART. 2.—The following regulations and conditions laid down for the radiotelegraphic service in Spain, besides the provisions affecting radiotelegraphy contained in the International Convention made in Berlin on November 3rd, 1906, together with the Service Regulations appended thereto, shall be applied to all wireless stations, whether public, official or private, on the coast of the Peninsula, the Balearic and Canary Islands, the African possessions of Spain, and to all ships navigating those territorial waters.

ART. 3.—Ship stations shall be free to select their system of wireless installations; but for coast stations the administration shall adopt the system and equipment judged to be the best available from the point of view of scientific, technical and economic progress.

ART. 4.—All coast wireless stations shall be linked with the general telegraphic system, by means of private lines, in order to secure rapid communications.

ART. 5.—The working of wireless stations of all classes shall be carried out in such way that, as far as possible, no disturbance may be occasioned to other stations of the same kind.

ORGANISATION OF WIRELESS STATIONS.

ART. 6.—Wireless stations of all kinds must maintain reciprocal communications with the least possible waste of power.

ART. 7.—Wireless stations in Spain shall use the international signals of the Morse Code for the transmission of messages.

ART. 8.—All wireless installations in Spain, including both coast and ship stations, open to the public, must carry on an interchange of messages irrespective of their wireless systems.

During the working hours fixed for each coast station the latter must receive the Morse signals and must also have a transmitter so disposed as to be able to reply in the signals of the same code.

ART. 9.—Coast wireless stations must accept and must give *absolute priority* to calls for help from ships in danger. They must, moreover, answer the said calls in the same order of priority and pass them on as urgent messages to the general telegraphic service.

ART. 10.—The administration shall establish three classes of stations—viz., public, official, and private. Those of the first class must have a radius of 600 kilometres and over, those of the second class one of 400 kilometres (there or thereabout), and those of the third class one of 200 kilometres. Exceptions may be made in accordance with practical experience in working.

ART. 11.—First class stations shall have three wave-lengths at their disposal—namely, one of 300 metres, another of 600 metres, and another which may reach the maximum length, but which must not be less than 1,600 metres. The last two will be used normally. The second and third class stations shall have two wave-lengths—namely, one of 300 metres and one of 600; and those of the second class will use normally the 600 metres wave-length, whilst those of the third class will use one of 300 metres, except in the cases referred to in Art. 14 final paragraph.

Coast stations situated near each other may maintain a special service between each other, provided that the distance between them allows of their doing so; but they must give preference to the Maritime Service. In the latter case, and for communications with national vessels on official matters, coast stations of both classes are allowed to use the special wave-lengths to which their installations are adapted or adaptable for these services.

ART. 12.—Ships belonging to the Spanish Merchant Service shall use a normal wave-lengths of 300 metres, but they can alter this to a maximum of 600 metres.

Only in exceptional cases are vessels of small tonnage allowed to use *normal waves* of less than 300 metres.

ART. 13.—The General Post and Telegraph Office shall publish and keep always up to date a Directory showing the coast and ship wireless stations authorised and open to the public; together with the following information:—

(1) Name and geographical position of the coast station; identification signal in the International Code, and the port of register of the ship fitted with wireless.

(2) Call letters. (These must be all different and must be formed by groups of three letters).

(3) Normal range.

(4) Wireless system adopted.

(5) The class of receiving apparatus, whether automatic or auditive, etc.

(6) Length of waves used by the station. (The normal wave must appear in *italics*.)

(7) Class of service rendered by the station. This covers such items as general communication, restricted communication (*i.e.*, communication with ships, with steamship companies, with ships fitted with apparatus of the same system, etc.); public long distance communications; communications of a private nature; special communications (*e.g.*, those of an exclusively official character), etc.

(8) Hours of service.

(9) Coast and ship station rates.

The Directory above-mentioned shall also include information regarding wireless stations not open to general public service and the existence of which has been made known to the International Bureau by the Spanish Administration.

ART. 14.—Wireless service in coast stations shall be, whenever possible, of a continuous nature, operating both night and day without interruption.

The Post and Telegraph Office shall fix, in each case, the hours of service of those stations where the service is limited.

Coast stations where the service is not of a continuous nature cannot close for the day without having transmitted all radiotelegrams to ships within their sphere of action and without having first received all the radiotelegrams advised by them. This proviso shall also apply in the case of ships signalling their presence before the closing hour of the station.

ART. 15.—Private corporations cannot instal ship stations nor can they work any such station without Governmental authorisation. Permits in these cases will be issued in accordance with the provisions of the Berlin Convention and Regulations, by the Ministry of Marine, and will be communicated by the latter to the General Post and Telegraph Office.

Ship stations duly authorised must fulfil the following conditions:—

First.—The system employed must be a tuned system.

Second.—The speed, both for the reception and transmission of messages, must not under normal circumstances be less than twelve words per minute, allowing five letters to the word.

Third.—The power transmitted to the wireless apparatus must under normal circumstances, not exceed one killowatt. Nevertheless, greater power can be used if the ship is obliged to communicate over a distance exceeding 300 kilometres from the nearest coast station; or, if by reason of any interference, no communication can be established without increasing the power.

The service at the coast and ship stations shall be attended to by operators having their qualifying certificates issued by the General Post and Telegraph Office. This certificate must state the professional knowledge of the operator in the following matters:—

(a) Equipment of the apparatus.

(b) Auricular transmission and reception at a speed of not less than twenty words per minute.

(c) The knowledge of the regulations regarding interchange of wireless communications.

The qualifying certificate must also state that the Government has notified the operator that it is his duty to treat all communications as confidential.

Steamship companies are allowed to employ their own qualified operators provided they fulfil the conditions hereinbefore mentioned.

THE MAKING-OUT AND PRESENTATION OF MESSAGES.

ART. 16.—For the making-out and presentation of radiotelegrams the provisions of Articles 10, 11 and 33 of the Berlin Conference Regulations, in addition to the rules laid down in the following articles, shall be observed.

ART. 17.—Radiogram forms must have the words *Radio Service* on the heading.

On the transmission of messages from ship to coast stations no mention will be made of the date and hour of deposit.

On the re-transmission to the telegraph lines the coast stations shall note their own name as that of the station of origin, followed by the name of the ship, and shall register as the hour of transmission the time at which the radio was received by them.

ART. 18.—The instructions for delivery of messages destined for ships at sea must be as complete as possible. The form must be filled up as follows:—

First.—The name of the addressee with additional indications if necessary.

Second.—The ship's name as it appears in the Directory, adding her nationality, and if necessary, as in cases where there are two or more ships of the same name, adding also her identification letters in the International Code.

Third.—The coast station name as it is given in the Directory.

ART. 19.—The following messages will not be admitted:—

- (1) Reply-paid messages.
- (2) Money orders.
- (3) Messages to be paid on delivery.
- (4) Messages demanding acknowledgement of reception.
- (5) Messages to be forwarded.
- (6) Messages at special rates, except those for transmission on the telegraphic section or over-land wires.
- (7) Messages marked "*urgent*," except on the over-land wired service, and then only with the reservation that the provisions of the international telegraphic regulations must be applied.
- (8) Messages to be forwarded by post or express.

ART. 20.—The messages may be written in plain language or in code in accordance with the interior regulations for ordinary service and with the international conventions on the matter.

ART. 21.—The officials at the stations can ask the senders of wireless messages to prove their identity.

RATES AND EXECUTIVE REGULATIONS.

ART. 22.—In the counting of words in order to apply the rates the officials must follow the provisions of Articles 18, 19 and 20 of the International Telegraph Service Regulations as revised in London in 1903.

ART. 23.—In conformity with Article 10 of the Berlin International Convention, the total rate for wireless messages shall include :—

1. The rate applicable to the maritime section, namely,
 - (a) the rate in force at the *coast station*.
 - (b) the rate in force at the *ship station*.

2. The rate established for the over-land wired service, national or international, calculated in accordance with the general rules.

ART. 24.—The rate applicable to the maritime section is hereby fixed at 0.75 pesetas per word, of which 0.45 belongs to the coast station and 0.30 to the ship station.

With regard to the international service, in the case of messages to and from foreign ships, these rates shall be payable in francs, on the same basis.

The rate applicable to the over-land wired service, national or international, shall be calculated and allocated in accordance with the interior regulations and with the international regulations.

The minimum rate applicable to the maritime section of wireless messages is hereby fixed at 7.50 pesetas, which is the wireless rate for a radiogram of ten words.

ART. 25.—The coast station rate will be charged only once, even if the message goes through several coast stations.

ART. 26.—The whole cost of the radiotelegram must be paid by the sender, and at ship stations a tariff indicating this must be displayed.

ART. 27.—For the purposes of book-keeping the coast station must consider itself as addressee with regard to the messages coming from the telegraphic service on their way to ship stations; and the coast station must consider itself as the original office with regard to the messages coming from ship stations for transference to the telegraphic service.

ART. 28.—Coast and ship station rates shall be calculated in accordance with the number of words computed, and in accordance with Article 23 of these Regulations.

ART. 29.—Merchant ships at sea can interchange messages if they find it convenient. The rates to be charged in such cases shall be laid down by the respective owners and shall not be taken into account by the National Administration.

ART. 30.—Ship stations on Spanish vessels shall send to those chartering them, upon their arrival in port, all documents in connection with and referring to all messages exchanged with coast stations. The charterers shall send such documents monthly to the General Post and Telegraph Office, where it will be kept for a minimum period of twelve months and where liquidation of the accounts must be made in due course.

ART. 31.—The installations on Spanish men-of-war shall use, in their communications with the coast stations open to the public, the wave-lengths which—under the terms of the Berlin Regulations—may be agreed upon between the Minister of Marine and the Minister of the Interior for the official service.

Both Spanish and foreign men-of-war can exchange private messages with the coast stations or with merchant ships; but only for

the benefit of their crews. In such cases the technical and tariff provisions of these Regulations and those of the Berlin Convention and the Berlin International Regulations for the transmission of public correspondence, must be observed, as in the case of a merchant ship station open to the public. The regulations established to prevent the disturbance of wireless communications must be most carefully adhered to.

ART. 32.—When men-of-war exchange messages (private) with coast stations or with other ship installations they must follow the rules established for the computation of words and the collection of rates. In such cases the ship's purser in the Spanish vessels and the Minister of Marine shall respectively exercise similar functions to those assigned to the administration on board, and to the owner, as far as merchant ships are concerned.

In the calculation of coast and ship station rates for private service exchanged with foreign men-of-war, the General Post and Telegraph Office shall come to an understanding with the Administration of the country to which the said men-of-war belong.

ART. 33.—The same provisions shall hold good in the case of a military wireless installation, either permanent or portable, when the said installation utilises the stations established by the Administration for Public Service.

ART. 34.—Should, by some accident, the Submarine Cable Service be substituted for the Wireless Service for the sending of a message, the former shall only receive the rate applicable to a coast station. If communication by wireless is established between two points in Spanish territory otherwise without telegraphic communication, the rates charged shall be those of the Interior Telegraphic Service, and the rules of that service shall apply, except in the cases provided for in Article 19 of these Regulations.

ART. 35.—In the matter of transmission of messages, of the signals to be employed in them, orders of transmission, calls, acknowledgments of receipt, instructions as to the route to be followed by the radiograms, and instruction as to their final destination, the provisions made in Articles 15 to 32, both inclusive, of the Berlin Regulations must be observed.

ART. 36.—In cases when the return of charges made for radiotelegrams has been justly established, the provisions of Article 35 of the Berlin Regulations must be observed.

BOOK-KEEPING.

In matters referring to book-keeping for the international wireless service the provisions of Article 36 of the Berlin Regulations must be observed.

GENERAL RULES.

ART. 38.—Coast stations, previously authorised by the General Post and Telegraph Office, shall furnish the authorised agents of Maritime Information Bureaux with all such particulars concerning wrecks and disasters at sea as are of any interest to navigators, always provided that the said agents apply for such information.

ART. 39.—Authorised interchange of messages between ship stations on the high seas must be carried out in such a way as not to disturb the coast station's service. The latter shall have, as a general rule, the right of priority for Public Service.

ART. 40.—The order of transmission between ship stations on the high seas shall be settled by agreement between themselves.

The re-transmission of messages between ships at sea shall be arranged by agreement between the interested parties.

ART. 41.—The provisions of the International Telegraphic Regulations shall be applied by analogy, to radiotelegraphic communication as far as they are not antagonistic to these Regulations, or to the Convention, Additional Agreement, and the International Regulations of the Berlin Conference.

ART. 42.—The provisions of Articles 5, 6, and 9 of these Regulations shall apply to all classes of wireless installations, official and authorised, even if they are not open to Public Service.

Madrid, January 24th, 1908.

Approved by His Majesty the King.—Maura.
(There is a Seal.)

ROYAL ORDER OF SEPTEMBER 4TH, 1914.

D ART. 1.—According to the Royal Order of January 24th, 1908, the inspection and regulation of the Wireless Telegraph Service on board vessels of the Mercantile Marine are under the supervision of the Minister of the Navy, and by delegation to the Director-General of Fisheries and Merchant Shipping. The installations should fulfil all the requirements of the said Royal Order together with the rules and regulations of the London Radiotelegraph Convention of June, 1913, and the rules of the Safety of Life at Sea Convention, January, 1914.

Everything affecting the service shall be controlled by the Navigation Department, which shall attend to the following matters:—

- (1) The registration of all new installations authorised.
- (2) The forwarding of all documents regarding such new installations accompanied by the order for their recognition.
- (3) The sending of a report to the Home Office and War Office as to the result obtained from the various installations, together with indications of their characteristics.

To attend to this service the Director of Navigation and Fisheries will nominate a chief or a superintending official, together with five wireless inspectors on the coast, and this staff must have the qualifications as set forth in the Royal Order of May 21st last.

ART. 2.—The distribution of the staff on the coast and in the maritime provinces under each inspector shall be as follows:—

Barcelona:—Maritime provinces of Barcelona, Tarragona, Valencia, Mallorca and Minorca (the residence of the inspector being at Barcelona).

Cartagena:—Maritime provinces of Alicante, Cartagena, Almeria and Malaga, Melilla and Ceuta (the residence of the inspector being at Cartagena).

Cadiz:—Maritime provinces of Cadiz, Canary Islands and Huelva (the residence of the inspector being at Cadiz).

Vigo.—Maritime provinces of Vigo, Pontevedra, Villagarcia and Coruña (the residence of the inspector being at Vigo).

Bilbao.—Maritime provinces of Gijon, Santander, Bilbao and S. Sebastian (the residence of the inspector being at Bilbao).

ART. 3.—The wireless inspectors shall be under the orders of the Commandante de Marina of districts to which they are attached and in the ports of which they will have to make their annual inspection. They will only be allowed to leave their habitual place of residence when, for the convenience of the shipbuilders, they have to inspect a station in any other port in their district.

ART. 4.—The wireless inspectors must attend to the following duties :—

(a) To verify and inspect all new installations concerning which they may have been notified by the Director-General of Navigation and Fisheries that they are ready for public service, and to send in a report of the result of their verification and inspection.

(b) To visit annually the installations of such ships as are registered in the ports belonging to the districts within their jurisdiction, and to issue the necessary certificate according to the London Safety of Life at Sea Convention.

(c) To inspect foreign ship stations on board vessels which take passengers in Spain with the object of verifying that they are in possession of the certificate issued under the Safety of Life at Sea, which certificate must have been issued by the marine authorities of their respective countries.

(d) To report to the Director-General all remarks or complaints made by the shipowners, crew, or passengers in regard to this service so that the aforesaid Director may take such necessary steps as he may think fit.

(e) To see that all the staff who work the installations are in possession of the Government certificate according to the law of January 24th, 1908, with the object of making sure that all these installations are handled by duly qualified operators.

ART. 5.—For those duties a register book will be given to the wireless inspector in which he shall note the following particulars of each visit :—

(a) Date and place of inspection.

(b) Name of the vessel.

(c) System, radius, wave-lengths, etc.

(d) Names of operators and dates of their certificates.

A copy of this information is to be sent every quarter to the Director-General in order that he can make out a list and maintain a register devoted to all important information and data.

ART. 6.—The naval and marine authorities will do their best to facilitate the work of the inspector, putting at his disposal the *craft* and *personnel* required by him for the fulfilment of his duties.

ART. 7.—When it is desired to instal a wireless station on board a ship, the builder, the owner, the agent or the captain must ask for permission from the Director-General of Navigation and Fisheries. As

soon as the installation is completed the applicant must notify the above authority, stating the port in which he desires the visit to be made, so that the wireless inspector may receive instructions accordingly.

ART. 8.—Wireless installations are sub-divided into three classes :—

- (1) Stations with permanent service.
- (2) Stations with limited service.
- (3) Stations with special service.

Class 1 includes all vessels which carry twenty-five or more passengers and which have an average speed of fifteen or more knots. This class includes also ships carrying 200 or more passengers, having a speed of over thirteen knots, and travelling a distance of over 500 miles between two consecutive ports. The latter vessels should carry at least two telegraphists.

To Class 2 belong all the steamers not included in Class 1, provided they are fitted to carry twenty-five passengers or more. During the voyage the ships of this class must have one telegraphist on constant watch during seven hours per day and ten minutes at the beginning of the other hours.

In cases where the vessel is more than 500 miles distant from the nearest coast, the watch must be permanent.

To Class 3 belong all ships which are not included in Classes 1 and 2, and having fifty or more persons on board and carrying less than twenty-five passengers or none.

The watch service on these ships must be continuously maintained during a transatlantic voyage or when the ship is over 1,000 miles distant from the coast. In special circumstances, and whenever advisable for the safety of life at sea, ships of every class may be obliged to keep a constant watch.

Vessels belonging to subsidised Government lines are obliged to carry wireless, no matter where they sail to or what crew they carry.

ART. 9.—The radius of the wireless station shall be a minimum of 100 miles at sea in day-time when communicating with ships under normal conditions and circumstances.

All the stations must be provided with an emergency set, installed on the upper deck, which must be kept in the best condition, having a source independent of the main electric supply and capable of being set in instant working order; this set must be able to work during six hours at least, and must possess a radius of a minimum of eighty miles for ships of the first class and fifty miles for the others.

ART. 10.—When testing the transmission and reception of messages, both installations shall be made to work with a ship at a distance of about 100 miles.

The wave-length and the oscillation current of the aeri-als must be measured.

When the Director-General thinks it necessary, the curves of resonance will have to be made and the degrees of coupling adjusted. When it is necessary to test the state of the receiving apparatus, the Director may order that one or several of the officers in that service shall make trial tests with the different stations at various distances during the voyage.

ART. 11.—Inspections must be made at the ports of Barcelona, Cartagena, Cadiz, Vigo and Bilbao, which are the places of residence of the wireless inspectors. However, if for the convenience of builders, the inspection should be carried out at some other port, these builders must defray the travelling expenses of the said inspector.

ART. 12.—The radio inspectors shall receive remuneration for all the inspections they carry out with regard to wireless installations.

The amount of this remuneration shall be 100 pesetas with an increase of twenty-five pesetas for each auxiliary transmitter which the ship may carry independent of the emergency installation. Such remuneration shall be the same whatever the rank held by the radio inspector.

The annual inspections held for the issue of certificates in accordance with the provisions of the London Safety of Life at Sea Convention shall be made free of charge.

(Signed) RAMON ESTRADA,

Director-General of Navigation and Marine Fisheries.

Madrid, September 4th, 1914.

ROYAL DECREE DATED FEBRUARY 20TH, 1917.

Inscribed in the Official Record Under No. 49.

E His Majesty the King (whom God save) inspired by the sentiment of humanity, of which the crews of the merchant ships which in these difficult times with bravery and with risk to their lives maintain our maritime commerce are deserving, has, in accordance with the proposal of the Director-General of Navigation and Sea Fisheries, deigned to decree—

1. All merchant ships of 500 tons and upwards which make long sea voyages or long coasting voyages must carry a wireless installation having a minimum range of 100 miles, as laid down under the International Radiotelegraphic Convention.

2. Similarly the said ships will carry one or more lifeboats in proportion to the number of the crew, each fitted with its own motor, or provided with adjustable motors of such a kind as to answer the same purpose.

3. Local directors of navigation shall allow a certain time for each ship to be provided with these things, the shipowners having to certify before the said authorities that they have taken the necessary steps or made definite contracts to obtain them.

ROYAL DECREE DATED JUNE 22ND, 1917.

F In view of the request made by the "Cia Nacional de Telegrafia sin Hilos," His Majesty the King (whom God guard) has been pleased to order that all the radiotelegraphic stations concerned in the Royal Decree of February 20th last inscribed in the Official Record under No. 49 shall carry emergency installations in accordance with Article 9 of the regulations for the service of installation and inspection of radiotelegraphy on board merchant ships on September 4th, 1914, excepting those installations which have sources of energy independent of that which forms a regular part of the ship's equipment and is fitted on deck.

Madrid, June 22nd, 1917.

ROYAL DECREE DATED OCTOBER 12TH, 1917.

Issued in the Form of a Circular Published in the Official Gazette of the Spanish Ministry of Marine No. 235 of November 19th, 1917.

G In view of the collection of information by this Administration for the fulfilment of the Royal Orders of February 20th and June 16th last (inserted in the Official Gazette of this Ministry and numbered 29 and 143 respectively) relative to the complete installation of wireless telegraphs on board merchant vessels of 500 tons and upwards, which are engaged in overseas and extended coasting trade, with a minimum range of 100 miles, on the conditions notified in the regulations governing wireless telegraphy.

And in view of the data recently communicated by the companies "A. E. G. Thomson Houston Iberica" and "Nacional de Telegrafia Sin Hilos," the former saying that its resources permit the construction of 25 stations per month and that within one year 300 can be provided, whilst the latter give an assurance that they are able to supply wireless stations with the least possible delay, but not defining the duration of this delay.

It resulting from previous communications from this Department that there are 57 stations already fitted and arranged for, and that there remain some 80 to be constructed or fitted.

It resulting, moreover, that this Administration deems a delay of eight months to be sufficient for the "Compania Nacional de Telegrafia Sin Hilos" to supply these 80 stations, that company being looked upon as a firm reputed in the business world as of good standing and with resources fully equal to those of the "A. E. G. Thomson Houston Iberica," and the delay of eight months being the double of that within which the latter undertake to fulfil those engagements.

His Majesty the King (whom God guard) in conformity with the information supplied by this Administration, and in agreement with his Privy Council, has thought it well to dispose that, beyond a delay of eight months from the date of publication of this Royal Order, the sailings of the ships mentioned in his Decree of February 20th of the present year shall be estopped if they fail to be fitted with complete wireless stations in accordance with the existing regulations, and that the Marine authorities in the provinces shall carefully communicate this decision to those who appear in their books as proprietors of the respective ships.

STRAITS SETTLEMENTS

A CROWN Colony of the Straits Settlements comprises Singapore, Penang, and Malacca. These settlements were transferred from the control of the Indian Government to that of the Secretary of State for the Colonies on April 1st, 1867. The Cocos Islands and Christmas Island, have been since annexed to the Colony.

The administration is vested in the hands of a Governor, aided by an Executive Council, legislature being under the direction of a legislative Council, presided over by the Governor.

Commercial wireless telegraph stations have been erected at Singapore and Penang. These installations are Government land stations under the control of the Postmaster-General, Mr. F. M. Baddeley, at Singapore.

The administration of wireless telegraphy is regulated by the Wireless Telegraph Ordinance of 1912, together with the regulations issued thereunder, and a further Wireless Telegraphy Ordinance of 1917, which, as will be seen from the text published *in extenso* below, is more or less of a war measure, and liable, therefore, to supersession on the return of peace.

LIST OF REGULATIONS:

A—Ordinance of December 16th, 1912.

B—Regulations of January 5th, 1914.

C—Regulations, of August 14th, 1917.

ORDINANCE OF DECEMBER 16th, 1912.

PROVIDING FOR THE REGULATION OF WIRELESS TELEGRAPHY.

A 1. This Ordinance may be cited as "The Wireless Telegraphy Ordinance, 1912."

2. The expression "wireless telegraphy" means any system of communication by telegraph as defined by "The Telegraph Ordinance, 1895," without the aid of any wire connecting the points from and at which the messages or other communications are sent or received:

Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. The Governor may, whenever he shall deem it expedient to do so, licence the establishment of any wireless telegraph station or the installation or working of any apparatus for wireless telegraphy in any place in the Colony or on board any British ship registered in the Colony.

4. (1) No person shall establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place in the Colony or on board any British ship registered in the Colony except under and in accordance with a licence granted in that behalf by the Governor.

(2) Every such licence shall be in such form and for such period as the Governor in Council may determine, and shall contain such terms, conditions and restrictions on and subject to which the licence is granted as the Governor shall consider desirable in the public interest.

5. (1) If any person establishes a wireless telegraph station without a licence in that behalf or installs or works any apparatus for wireless telegraphy without a licence in that behalf he shall be liable to a fine not exceeding one thousand dollars or to imprisonment of either description for a term not exceeding twelve months, and in either case be liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence, but no proceedings shall be taken against any person under this Ordinance except with the previous sanction of the Public Prosecutor.

(2) If a magistrate is satisfied by information on oath that there is reasonable ground for believing that a wireless telegraph station has been established without a licence in that behalf or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any ship within the jurisdiction without a licence in that behalf he may grant a search warrant to any police officer to enter and inspect the station, place or ship and to seize any apparatus

which appears to him to be used or intended to be used for wireless telegraphy therein.

6. (1) The Governor in Council may make regulations for all or any of the following matters :—

(i) For prescribing the form and manner in which applications for licences under this Ordinance are to be made ;

(ii) for prescribing the fees payable on the grant of any licence ;

(iii) for regulating the manner in which apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, in the waters of the Colony shall be worked so as to prevent interference with naval signalling or the working of any wireless telegraph station lawfully established, installed, or worked in the Colony or the waters thereof, and so as not to interrupt or interfere with the transmission of any wireless messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea ;

(iv) for prohibiting, except with the special or general permission of the Postmaster-General of the Colony the working or using of any apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, whilst such ship is in any of the harbours of the Colony ;

(v) for prohibiting or regulating in case at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy on board merchant ships, whether British or foreign, in the waters of the Colony the use of wireless telegraphy on board such ships while in such waters by such further rules as the Governor may see fit to make from time to time, and either in all cases or in such cases as may be deemed desirable.

(2) Provided that no regulations made in respect of the matters described in paragraphs (iii) (iv) and (v) of this section shall apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

7. When an applicant for a licence proves to the satisfaction of the Governor that the sole object of obtaining the licence is to enable him to conduct experiments in wireless telegraphy a licence for that purpose shall be granted, subject to such special terms, conditions and restrictions as the Governor may think proper, but shall not be subject to any rent or royalty.

8. (1) Every omission or neglect to comply with and every act done or attempted to be done contrary to the provisions of this Ordinance or of any Regulation made thereunder, or in breach of the conditions and restrictions subject to or upon which any licence has been issued shall be deemed to be an offence against this Ordinance, and for every such offence not otherwise specially provided for the offender shall, in addition to the forfeiture of any articles seized, be liable to a fine of five hundred dollars.

(2) All convictions, forfeitures and fines under this Ordinance or any Regulations made thereunder may be had and recovered before a district court.

REGULATIONS.

B The following Regulations, dated January 5th, 1914, were made under the "Wireless Telegraphy Ordinance, 1912"—

1. All apparatus for wireless telegraphy on board a merchant ship whether British or foreign in the waters of the Colony shall be worked in such a way as not to interfere with (a) Naval signalling, or (b) the working of any wireless telegraph station lawfully established, installed, or worked in the Colony or the waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. No apparatus for wireless telegraphy on board a merchant ship whether British or foreign shall be worked or used whilst such ship is in any of the harbours of the Colony except with the special or general permission of the Postmaster-General of the Colony.

3. If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships whether British or foreign while in the waters of the Colony shall be subject to such further rules as may be made by the Governor from time to time, and such rules may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

4. These Regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

REGULATIONS OF AUGUST 14TH, 1917.

No. 992.

THE WIRELESS TELEGRAPHY ORDINANCE, 1912.—REGULATIONS UNDER.

C In exercise of the powers conferred by section 6 of the Wireless Telegraphy Ordinance, 1912, the Governor in Council is pleased to make the following regulations:—

1. All apparatus for wireless telegraphy on board a merchant ship whether British or foreign in the waters of the Colony shall be worked in such a way as not to interfere with (a) Naval signalling, or (b) the working of any wireless telegraph station lawfully established, installed, or worked in the Colony or the waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. (a) The wireless telegraph stations on board ships (other than His Majesty's ships of war or allied ships of war or Colonial Government vessels) shall not be worked whilst such ships are within a harbour of the Colony of the Straits Settlements.

(b) For the proper enforcement of the above, ships of British register in harbours of the Colony must completely disconnect their aerial wires from their wireless apparatus, the ends of such wires

being suspended entirely clear of the wireless telegraph cabin, preferably from the main rigging in such a manner as to show they are properly disconnected.

(c) Ships of neutral register in a harbour of the Colony must take down their aerial wires completely and disconnect the same from their wireless telegraph apparatus.

(d) Ships of Allied register may, at the discretion of the Master Attendant or Harbour Master, be permitted to leave their aerials up, provided the same are disconnected in accordance with the provisions of paragraph (b) of this regulation.

(e) In addition to the above the operating room may be sealed or any other steps taken at the discretion of the Master Attendant or Harbour Master.

3. The Regulations made on July 12th, 1917, and published as Notification No. 871 in the *Gazette* of July 20th, 1917, are hereby cancelled.

SUDAN

(See EGYPT, page 267.)

SWEDEN

THE territory of the Kingdom of Sweden includes the eastern and main part of the Scandinavian peninsula. In the extreme north and north-east Norway and Russian Finland are her neighbours. The border on the Russian frontier is the Torne Elf, a river running from north to south, and falling into the northern end of the Botnic Gulf. Norway lies on the west of Sweden; and the Kiel, a chain of highland plateaus and mountains forms the natural boundary thereof. The Kattegat to the south-west and the Baltic in a southerly and easterly direction separate her from the European continent.

The length of the country is estimated to be 2,500 kilometres from 69° north to 55° east Greenwich, and the size 450,600 square kilometers. Population about 6 millions.

Sweden is a constitutional monarchy. The Parliament consists of two chambers, of which the second chamber is directly elected by the people, and the first by the municipalities, in a somewhat indirect way.

The Cabinet is appointed by the King, and is supposed to be backed by a Parliamentary majority. The constitution rests on the fundamental law of 1809, revised in 1865.

Wireless telegraphy, except so far as the Navy is concerned, has been placed in the hands of the Kungliga Telegrafstyrelsen, a body under the supervision of the Minister of Public Works.

The Head of the K. Telegrafstyrelsen is Mr. Sven Ludvig Herman Rydin, General Director; his deputy and chief of the administrating office is Count H. N. Hamilton. Other officials are: Chief of the Line Office, Mr. K. E. Landström; Chief of the Traffic Office, Mr. S. Ljungquist; Inspector of Wireless Installations, Mr. A. S. Litström; and the Director of Instruction of Wireless Telegraphy, Mr. J. G. Holmström.

In early days it was the Swedish Navy which organised wireless telegraph, and the naval authorities are still handling most of the stations along the Swedish shores.

For ship-and-shore traffic there are stations at Karlskrona, Gothenburg, Tinståde on the Island of Gotland, and at Vaxholm, near Stockholm. An important 50-kilowatt station has been erected near Karlsborg, and some more stations along the shores have been completed, but detailed particulars cannot be published under present circumstances.

List of Installations.

Land stations belonging to the Government	...	...	6
Experimental stations belonging to the Government	...	...	1
Instructional stations belonging to the Government	...	...	41
Ship stations on Government vessels	...	...	51
Ship stations on privately owned vessels	...	...	51

From the point of view of regulations, wireless telegraphy and telephony are controlled by the Act of August 31st, 1907, the contents of which have been published in previous issues of our Year-Book.

The following is the list of the texts of the Swedish Laws and Regulations which will be found appended hereto:

A—Act of August 31st, 1907.

B—Royal Decree of June 20th, 1913.

C—Resolution of Director-General of Telegraphs, August 22nd, 1913.

D—Extracts from Statute 131, dated August 10th, 1914, and Statute 514 of December 23rd, 1915.

E—Royal Decree, dated September 4th, 1916.

F—Royal Decree, dated January 12th, 1917.

ACT OF AUGUST 31ST, 1907.

A CONCERNING THE ESTABLISHMENT AND WORKING OF INSTALLATIONS OF RADIOTELEGRAPHY AND RADIO-TELEPHONY.

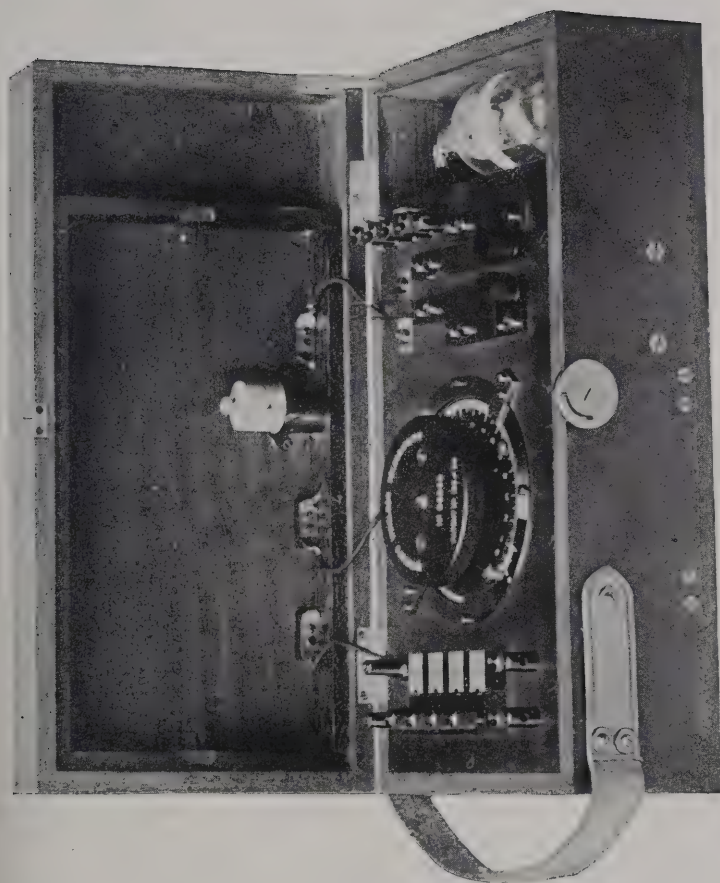
1. Whosoever desires to establish in Sweden, on land, or on board a vessel permanently moored in Swedish waters, an electric installation of radiotelegraphy or radiotelephony for public or private use must apply for an authorisation from the King.

2. The authorisation of the King must likewise be applied for, by any person or persons desiring to establish on board a Swedish vessel other than permanently moored, an installation of the kind referred to in Paragraph 1.

3. The authorisation granted by the King, as prescribed in Paragraphs 1 and 2, can only be granted for a certain period. In granting the authorisation, His Majesty prescribes, under the reservation of private rights, the manner and conditions under which the installation may be established and worked.

4. Whosoever establishes or works, without the authorisation of the King or contrary to the provisions prescribed in the authorisation, an installation within the meaning of the present law, is liable to a fine of from 25 to 1,000 kronen if the penalty incurred by this contravention is not included in the Penal Code.

5. If an installation within the meaning of the present law has been established without the authorisation of the King, or contrary to the provisions prescribed simultaneously with the authorisation, or



MARCONI DECREMETER WITH VACUUM AMPÈRE GAUGE.

(To face page 484.

if the authorisation has been revoked later by the King, it is the duty of the Governors of Provinces to take the necessary steps to prevent any use being made of the installation.

6. Every fine imposed under the present law reverts to the State. Fines not paid on account of the insolvency of the delinquent are expurgated by terms of imprisonment as prescribed in the Penal Code.

7. The provisions of this law do not apply to State installations.

8. All regulations and all dispositions concerning foreign vessels not permanently moored in Swedish waters, which may be considered necessary for the proper working in Sweden of installations within the meaning of this Act, are made by the King.

ROYAL DECREE OF JUNE 20TH, 1913,

B WHICH CAME INTO FORCE ON JULY 1ST, 1913, REPLACING THAT OF AUGUST 31ST, 1907 (see YEAR-BOOK OF WIRELESS TELEGRAPHY AND TELEPHONY, 1913, pp. 151-2).

1. The working of installations of radiotelegraphy or radiotelephony on board a foreign vessel not permanently moored in Swedish waters is, except in cases of distress, prohibited in those parts of the Swedish Archipelago and Swedish waters near to the coast stations which shall be designated by the Director-General of Telegraphs acting conjointly with the Admiralty.

It is the duty of the Director-General of Telegraphs, acting conjointly with the Admiralty, to communicate these provisions to navigators in the way he judges most convenient, and likewise to inform the Governors of the Provinces concerned.

2. In order to exploit such stations in a Swedish port on board foreign vessels above referred to a special authorisation of the General Direction of Telegraphs, acting in conjunction with the Admiralty, must be obtained; the parties interested shall furthermore be bound to conform to the instructions, detailed edicts, if necessary, made by the Direction-General of Telegraphs.

3. When an installation of the kind referred to above is exploited on board one of the foreign ships above-mentioned, the interested parties, if no regulation exists to the contrary, shall conform to the instructions fixed by the International Radiotelegraphic Convention which are in force with the service regulations thereto annexed.

4. Every contravention of this Decree, or of the regulations prescribed by the Direction-General of Telegraphs in virtue of Article 2 above, will be subject to a fine of 25 to 1,000 kronen.

The fines revert to the State. Fines not payable by reason of the insolvency of the delinquent are expurgated by terms of imprisonment as laid down in the Penal Code.

5. The provisions of Article 4 hereof shall not apply to vessels of war.

C The following resolution made by the Director-General of Telegraphs relating to the prohibition of working radiotelegraphic and radiotelephonic installations in proximity to Swedish coast stations was issued on August 22nd, 1913 :—

In view of the Royal decision relating to the installing of wireless stations on board of certain Swedish vessels :

In view of the Royal Order of June 20th, 1913, relating to the working in Sweden of radiotelegraphic and radiotelephonic installations on board foreign vessels :

The Direction-General of Telegraphs, conjointly with the Admiralty, brings to the notice of interested parties that within a radius of ten nautical miles from the nearest Swedish coast station the operation of radiotelegraphic or radiotelephonic stations established either on board of Swedish vessels or on board of foreign vessels is prohibited during the hours when such coast station is open for traffic, except in cases of distress or for the purpose of corresponding with the nearest coast station.

This resolution does not refer to Swedish ships of war.

(The above Regulation refers to the working of wireless stations on board foreign vessels, only whilst they are within the territorial waters of the Swedish Kingdom.)

EXTRACTS FROM STATUTES.

In addition to the Acts and Regulations printed above, we include below such extracts from the 1914 and 1915 Statutes as apply to wireless telegraphy. These cover Regulations affecting Ship Stations and the various restrictions imposed on their use whilst within Swedish Territorial Waters.

SWEDISH STATUTES, 1914.

NO. 131, DATED 10TH AUGUST, 1914.

His Royal Majesty's Gracious Rescript to H.M.'s Telegraph Department concerning prohibition of the use, within Swedish harbour precincts, of electric installations for wireless telegraphy or telephony on board of any vessel of a country at war.

In consequence of the outbreak of war between foreign powers, we have in connection with the provisions of Article 2 of our gracious proclamation of June 20th, 1913, concerning the use, within the confines of the realm, of electric installations for wireless telegraphy and telephony on board of foreign vessels, thought fit to ordain that until further notice it shall not be permitted to use such installations within Swedish harbour precincts on board of any vessel of a country at war. Which is hereby graciously brought to your notice for your cognisance and guidance.

SWEDISH STATUTES, 1915.

NO. 514 OF 23RD DECEMBER.

Fifth Chapter.

Equipment of Vessels.

I.—Wireless Telegraph Installation.

ART. 56.

Vessels which must be provided with wireless installation.—Vessels which are used for voyages between different countries or between a country and any of its colonies, possessions or protectorates, shall be equipped with wireless telegraph installation, provided however—

That such installation shall not be required if the vessel has fewer than 50 persons on board or if although the number on board is 50 or over, this is exclusively due to the fact that the master, by reason of

sickness among the crew or through other compelling, unforeseen circumstances, has been obliged to supplement the crew, or has saved persons in distress at sea, or by reason of obligation, according to law, has taken with him seamen or other persons ;

And that the Board of Trade may, on application, grant exemption from the obligation of having such installation, if the Board, in view of the route or other circumstances concerning the voyage, finds that such installation is not necessary and if such application concerns :—

(a) Vessels which do not go out to a distance of more than 150 nautical miles from the nearest coast ;

(b) Vessels which only in exceptional cases and incidentally have 50 persons or more on board for the reason that they take stowers or stowage labourers with them on a certain part of the voyage, and which on the one hand do not sail from one continent to another, and on the other hand are, during the said part of the voyage, between 30° northern and 30° southern latitude ; or

(c) Sailing vessels which are of rather primitive construction and which it is practically impossible to equip with wireless installation.

ART. 57.

Concession and classes of vessels.—Concerning H.M.'s permission to carry out such installation as referred to in Art. 56, separate enactments have been issued.

In sanctioning such installation as aforesaid the King will fix the class in which the vessel shall be classified, in accordance with the nature of the attendance of the wireless telegraph station.

ART. 58.

Range of the installation.—The wireless installation shall be sufficiently powerful to be able to transmit in day-time, under normal conditions, signals which can be clearly distinguished at a distance of at least 100 nautical miles from the vessel.

ART. 59.

Spare installation.—Vessels which are to be equipped with wireless installation shall have a spare wireless plant. This shall be placed wholly and entirely in the upper parts of the vessel, as high up as possible, and all its parts shall be fitted up so as to be protected as much as possible.

The spare plant shall have a source of power which is exclusively intended for the spare plant, and which can be brought into action most speedily.

The source of power referred to in the second paragraph of this article shall be capable of acting for at least six hours with a minimum range of 80 nautical miles in the case of vessels, for which uninterrupted attendance of the wireless installation shall have been provided, and of 50 nautical miles in the case of any other vessel.

If the main installation meets the requirements of the first and second paragraphs hereof as regards the spare plant the spare installation shall not be required.

ROYAL DECREE OF SEPTEMBER 4TH, 1916.

1. When circumstances so demand, the captain of a Swedish Government ship of war is entitled to prohibit the use of wireless electrical telegraph or telephone on board merchant vessels, whether they be Swedish or foreign, so long as they remain in Swedish territorial waters.

And the warship captain is moreover entitled, if it seem necessary for the observance of his order under the rule, to instruct the lowering of the antennæ.

In case the aforesaid captain has not prescribed a specific period during which the prohibition against using the wireless installation shall remain in force, the installation may be used and the antennæ be hoisted, as soon as the warship is out of range for exchanging visual signals with the merchant vessels.

2. The captain of a merchant vessel who shall violate this rule, or omit to obey any order given in accordance with Par. 1, shall be liable to a fine ranging from 25 to 1,000 krone.

ROYAL DECREE OF JANUARY 12TH, 1917.

Referring to His Majesty's resolutions conferring concessions on certain Swedish vessels for the carrying of wireless telegraphic apparatus, and to His Majesty's Decree of June 20th, 1913, regulating the use within the Swedish Realm of wireless telegraph or telephone on the part of foreign vessels, the K. Telegrafstyrelsen (in consultation with the Admiralty) desires to make public proclamation that :—

The prohibition, affecting both Swedish and foreign ships, against utilisation of electrical wireless installations, both telegraphic and telephonic, published in the Decree of the K. Telegrafstyrelsen of the 22nd August, 1913, shall be extended to include the whole Swedish archipelago. The only exception to this rule shall be made in favour of foreign vessels in case of distress, and in favour of Swedish vessels which find themselves in a similar predicament, or which may desire to exchange, receive, or transmit messages with, from, or to, a Swedish coast station.

SWITZERLAND

THE Swiss Confederation is made up of the union of twenty-five separate political entities, or Republics, organised into twenty-two cantons.

The first Federal Organisation dates from September 12th, 1848, and the present Constitution came into force on May 29th, 1874. Supreme authority is exercised by the Federal Assembly, which consists of two Councils—the *Ständerath* or State Council, and the *Nationalrath* or National Council. The latter, which represents the Swiss people in its totality, consists of triennially-elected members, each member representing a population of 20,000 souls. The *Ständerath* (consisting of forty-four Deputies) represents the cantons, each canton contributing two members.

Both Chambers unite to elect the Federal Assembly which wields the supreme authority and higher executive of the Confederation.

The area comprises 15,976 square miles, the population (according to the census of July 1st, 1915) numbers 3,880,500. The Confederation extends from 45° 0' to 48° 0' north latitude, its longitude lying between 5° 0' and 11° 0' east of Greenwich. The length from north to south is 137 miles, the width from east to west 216 miles; the farthest points on its boundary are distant 223 miles from one another.

Wireless telegraphy is a State monopoly, based on the general Federal Law affecting telegraphs and telephones of December 16th, 1907, of which we print below the apposite clauses.

Licences are, however, granted for receiving stations only, available for a limited period, where these are to be used solely for the reception of time and weather signals. We append the form of such contracts.

At the outbreak of War the Federal Council prohibited the erection of new wireless stations, and revoked all existing licences for utilising receiving stations. These private installations were accordingly forthwith dismantled, their apparatus being confiscated and stored by the Telegraph and Telephone Department. By way of compensation for this, the Federal Council decided, for the benefit of the dispossessed licences, to carry out the clause of the International Confederation of October 25th, 1913, relative to an international time association.

Starting with August 1st, 1916, the International Time Signal radiated from the Eiffel Tower is on working days telephonically transmitted by the Telegraph and Telephone Department at Berne to subscribers residing in Switzerland.

The texts of the ruling Laws and Regulations reprinted here are:—

A—The Federal Telegraph and Telephone Law of 1907.

B—The Licence for Time and Weather Receiving Station.

C—Federal Decree establishing Telephonic instead of Wireless Reception of International Time Signals.

FEDERAL LAW REGULATING THE ORGANISATION OF TELEGRAPHIC AND TELEPHONIC ADMINISTRATION.

(Dated December 16th, 1907.)

CHAPTER I.

ART. 1.—The right to establish and exploit any form of **A** electrical telegraph and telephone in Switzerland, or to issue licences for any such apparatus is vested solely in the Confederation.

ART. 2.—Localities whose commercial, industrial, or political status warrants the establishment of telegraphic or telephonic stations shall contribute their just quota towards the expense of such establishment.

Subject to appeal to the Federal Council the Telegraph and Telephone Administration shall decide the matter of installation and extent of the facilities granted. The Federal Council shall specify the rules governing the subvention and guarantees to be given by communities and individuals.

ART. 3.—The right of usage of such facilities shall be common to all. No special privilege with regard to fees or priority of transmission or reception shall be granted to any.

Nevertheless, official communications of the Federal and Canton authorities, as well as messages concerning the Service of Posts, Telegraphs, Telephones, and Railways shall have priority over those of individuals.

ART. 4.—The Supreme Direction of Telegraphic and Telephonic Administration shall belong to the Federal Council.

All regulations affecting this branch of service shall be issued by the Federal Council, so far as the latter shall not have delegated its authority to the Postal, Telegraphic, and Railway Departments or to the responsible officials thereof.

ART. 5.—The Federal Council shall conduct all negotiations concerning general telegraphic and telephonic agreements abroad.

Ratification of such agreements must be made by the Federal Assembly.

The Federal Council may, however, finally ratify agreements concluded with bordering countries on the basis of the general conventions affecting telegraphy and telephony.

ART. 6.—The Federal Council shall appoint all telegraphic and telephonic officials and employees. The nomination of individual employees or fixed classes of employees may however be delegated to the Postal and Railway Department or to the Managing Director of Telegraphs and Telephones.

ART. 7.—The immediate superintendence of all the administration of telegraphs and telephones is delegated to the Postal and Railway Department which is moreover entrusted with the necessary executive power.

CHAPTER II.

This chapter contains Articles 8, 9, and 10 which enumerate the classes of chief officials.

CHAPTER III.

This chapter is concerned with the organisation of telegraphic and telephonic zones and the offices and officials to be established in connection therewith. It contains Articles 11 to 16 inclusive.

CHAPTER IV.

Herein are laid down (in Article 17) the classification and maximum salaries of chief officials.

CHAPTER V.

In this chapter we find Articles 18 to 22 embodying the general rules applying to the nomination basis of appointment and responsibilities of the various officials.

CHAPTER VI.

This chapter covers Articles 23 and 24 and concerns itself with offences and penalties. It also includes Article 25 enumerating the previous decrees abolished by this law and Article 26 the formal Direction of Issue.

PROVISIONAL LICENCE FOR TIME AND WEATHER
RECEIVING WIRELESS STATIONS.

There is hereby granted to of in
B the canton of a Provisional Licence to make
use of a receiving wireless station which shall be installed in the
premises of as well as for the erection of an antenna com-
posed of strands of metres length, between the
aforesaid premises and on the following conditions :—

1. The erection and upkeep, with all that thereto appertains, shall
be carried out in accordance with the regulations laid down by the
Federal Council with regard to electric installations, and shall be
carried out at the expense of the licensee, who shall have, moreover,
to come to an understanding with the corporations or individuals
whose property must be hired.

2. The installations granted must not in any way interfere with the
working and development of the telegraphic and telephonic systems of
the State and/or of the railway companies.

3. The oscillating circuit must be constructed so as to be capable
of exact and definite adjustment to a fixed length of wave.

4. The licensee must conform to the rules with regard to wireless
telegraphy, which may be laid down, from time to time, by the Federal
authorities.

5. The installation granted under this licence must be at all time
and in every part accessible to representatives of the administration
of telegraphs and telephones entrusted with the duty of control.

6. The installation shall only be used for the reception of time
signals. Any other employment thereof (for instance, exchange of
messages with radiotelegraphic stations in Switzerland, or outside its
frontiers, as well as the communication of any signals that may be
received, or of their tenor, to third parties) will be considered as a
violation of the rights of the confederation (see the provisions of Articles
23 and 24 of the Federal Law of December 16th, 1907, dealing with
the organisation and administration of telegraphs and telephones).

7. When changes of any importance have to be made in the
installation, or when its location has to be shifted, or if it is to be worked
by any other person, the licensee is required to immediately advise the
administration of telegraphs and telephones concerning the change.

8. The present licence may be withdrawn at any time and for any
period, and this may be done without conferring the right to any
indemnity. In such an event the whole installation must be displaced
at the cost of the licensee within 15 days from the period fixed for the
expiry of the licence.

9. The licensee shall be responsible for any loss or expense incurred
by the Federal administration in consequence of failure to carry out
the terms of the present licence.

10. The licensee shall pay to the Administrator of Telegraphs and
Telephones a fixed fee of five francs payable at the Central Local
Telegraph Centre of to defray the inspection and to cover
the cost of registering the licence.

Given at BERNE the day of19...

I/We, the undersigned, after having acquainted myself with the conditions and stipulations hereinabove set forth, declare myself/ourselves willing to accept them and abide by them.

The day of, 19...
(Signed)

TELEPHONIC TIME SIGNAL SERVICE.

SECTION A.

C Decree of the Federal Council dated July 21st, 1916.
The Swiss Federal Council, acting on the suggestion of its Postal and Railway Department, and in view of the Federal decision of March 27th, 1914, decrees :—

1. That the international radiotelegraphic time signal radiated daily at 10.56 and at 11 o'clock (H.E.C.) from the Paris Observatory by the Eiffel Tower Station, shall be—during working days—retransmitted telephonically by the Administration of Swiss Telegraphs and Telephones at Berne.

2. Any regular telephone subscriber may take up a subscription to the telephonic time signal, arranging therefore with his telephone exchange.

3. Subscriptions are monthly or annual, and are valid for the civil month or civil year.

The rates of subscription are :—

(a) Fr. 2.50 per month, or part of a month.

(b) Fr. 20 per year.

For eight months at least they must be paid in advance.

4. Over and above the possibility of regular subscriptions, telephone subscribers may arrange to be supplied with odd time-service messages on such circuits as receive them. Each separate message will be charged for at the rate of 20 centimes, and this fee will be included, with ordinary conversation charges, in the monthly account.

5. The Administrator of Telegraphs and Telephones will accept no responsibility with regard to any irregular working of the Telephonic Time-Signal Service ; nevertheless every endeavour will be made to assure and develop the service.

6. If any interruption in telephonic transmission of the time-signal last for more than seven consecutive days, without this arising from any fault on the part of the subscriber ; the subscription fee will be refunded proportionately to the duration of the interruption.

7. Every effort shall be made to carry this edict into effect on and from the 1st August, 1916.

The Postal and Railway Department shall take steps to carry this out.

Dated Berne 21st July, 1916.

SECTION B.

Method of Administration.

1. Every telephone subscriber who desires to subscribe to the Telephonic Time-Signal Service must address a written request to his

telephone exchange showing exactly what kind of subscription he desires to take up (see Article 4 of this section, paragraphs (a) to (c).

2. The telephone exchange which receives an application for such a subscription may, under this rule, accede to the application immediately.

On the reception of a first request for a subscription, the Telephone Exchange puts itself immediately in touch either with the Central Station through whose intermediary the time signal will be sent, or with its own local centre.

3. The originals of all applications for subscription must be sent to the Chief Office, through the intermediary of the local centres.

4. (a) The fees for annual subscriptions must be paid in advance for December, together with the half-yearly fees for the ordinary telephone service.

Fractional fees for subscription, which start on the day of the first reception of the time signal, or from the date of determination of a subscription up to the end of the year, are calculated *pro rata* in the same way as ordinary telephone subscription rates.

An annual subscription may be cancelled at any time by giving eight days' notice. When it is desired to determine a subscription which has not lasted for at least eight months, the monthly subscription rate is applicable thereto.

(b) Fees for monthly subscriptions for a settled period (temporary subscriptions) are payable in advance, and for the whole duration of the subscription.

In default of advice to the contrary on the part of the subscriber, his subscription is considered as cancelled on the expiry of the agreed period.

(c) Monthly subscriptions of indeterminate duration are renewed automatically month by month. They may be cancelled at the end of a month by notice given at least eight days in advance; the subscription fees being payable monthly and in advance.

(d) Requests for reception of odd time-service messages are only granted in the case of lines of some importance, and on condition that they are made at latest by 10.50 a.m. Applicants are rung up at 10.55 a.m.

Applications are noted by entering the number of the subscriber on tickets specially prepared for this purpose. These tickets serve as the basis for the rendering of accounts.

When it has not been possible to attend to an application, because the subscriber's line was engaged; his enquiry is charged as a local conversation. Fees for odd time-signal messages are charged for at the end of each month on the same invoice as conversation charges.

5. Subscription rates and charges made for odd time-signal messages come under sub-section 2 (c) of the accounts for messages, and must in consequence be entered, duly classified (see Article 4 of section (a) above) on Form No. 600 under "Other Receipts."

6. The commission allowed to exchange proprietors attached to central stations of Class III., and of intermediary stations, who have

to co-operate in the telephonic time-service, amounts to 25 per cent. on receipts. This commission is taken into consideration when the annual Telephone Accounts are adjusted.

Time-service communications in transit should be recorded in the same way as ordinary conversations in transit.

7. When the time-signal message is transmitted to an intermediary station linked up with a central station of Class III., the latter has only a right to a commission of 2 cents per communication in transit, and the commission of 25 per cent. on the message is allotted to the proprietor of the intermediary station.

TRINIDAD AND TOBAGO

(See WEST INDIES (BRITISH), page 553.)

UGANDA (PROTECTORATE OF)

THIS Protectorate and that of "East Africa" constitute the whole area (leaving out of account the ex-German territory) on the East Coast of Africa subject to British Rule.

Uganda came under British Dominion in 1890, and a portion of the territories was for a time administered by the Imperial British East African Company. The northern boundary is limited by the Sudan, the eastern by Lake Rudolf, the western by the Belgian Congo, and the southern by the ex-German Colony.

The administrative centre is Entebbe, the native capital of Uganda being Mengo, Kampala. Nile steamers from Kartoum ply to Rejaf. The Uganda Railway runs from Ki-umu on Lake Victoria Nyanza to Mombasa on the coast of East Africa. The telegraph line is linked with the Sudan and runs as far as Nimule.

Wireless telegraphy is administered under the following :—

ORDINANCE.

1. This Ordinance may be cited as "The Wireless Telegraphs Ordinance," 1908.

2. No person shall use or establish any apparatus or installation for the purpose of operating wireless telegraphs without a licence from the Governor.

Any person contravening the terms of this section shall be liable on conviction to a fine not exceeding Rs. 1,500 or to imprisonment of either kind for a term not exceeding twelve months, and any apparatus or installation in respect of which an offence under this section is committed may be forfeited and sold or disposed of as the Governor may direct.

3. It shall be lawful for the Governor from time to time by rules to prescribe the terms and conditions upon which licences to use or establish apparatus or installations for the purpose of operating wireless telegraphs may be granted.

UNION OF SOUTH AFRICA

(See SOUTH AFRICA (UNION OF), page 462.)

UNITED STATES OF AMERICA (THE)

THE declaration of independence of the States of the American Union was adopted by Congress July 4th, 1776. The Constitution of September 17th, 1787, lays down the basis of government under which (modified by amendments in 1787, 1791, 1798, 1804, 1865, 1868, 1870, and 1913) this great and powerful Republic is now governed.

The Union comprises 48 STATES, each of which is provided with a Legislature of two Houses, a Governor at the head of the Executive and a judicial system. The District of Columbia (D.C.) is the seat of the Federal Government, and was provided by the State of Maryland for this purpose in 1791. It is co-extensive with the City of Washington, and embraces an area of 60 miles. The TERRITORIES of Alaska and Hawaii are governed by local Legislatures, whose Acts may be modified or annulled by Congress. The grand total of the superficies governed under the U.S.A. Constitution amounts to 3,574,658 square miles.

N.B.—*There are moreover DEPENDENCIES administered by the U.S.A. Government. Their rule is undertaken by a Governor and staff appointed by the President. Porto Rico and the Philippines belong to this division, although provided with Representative Government. Guam, in the Mariana Archipelago (Pacific Ocean), and the Samoan Islands are pure Dependencies administered by the U.S. Navy Department. Wireless in all these instances is controlled by the Navy Department, and there are no special Laws and Regulations.*

The "CANAL ZONE" on the Isthmus of Panama ranks as a Dependency, but it has been judged best to print the wireless particulars relating thereto separately under the heading "Panama—Canal Zone."

In September and October, 1899, Senatore (then Mr.) Marconi installed a radio station for the purpose of reporting the International yacht races between the yachts *Shamrock* and *Columbia*. The *New York Herald* on October 1st, 1899, tells the story of how the wireless was used for sending bulletins from the decks of the steamships *Ponce* and *Grande Duchesse* which followed the contending yachts.

According to the most reliable information obtainable, the first regularly operated radio stations in the United States were at Siasconset (Nantucket), Mass., and on Nantucket Shoals Lightship No. 66, work on which was started early in the summer of 1901. These stations were not experimental, or demonstrational, or temporary stations, but were erected for the particular purpose of providing for the regular daily transmission of ship news, and for regular communication and exchange of messages with vessels equipped with similar apparatus. They were owned and operated by the *New York Herald*, and were equipped with Marconi apparatus purchased from, and installed by, the English Marconi Company.

The *New York Herald* of August 17th, 1901, contains an account of how the first radiotelegraphic station at Siasconset got into communication by wireless with the Nantucket Shoals Lightship. The latter on August 16th received from the s.s. *Lucania*, of the Cunard Line, at a distance of 72 miles, the first connected wireless message ever radiated to the United States from an approaching vessel. That message ran "All well on board."

In 1899 (the same year as that of the first wirelessly reported yacht races) the matter of establishing radio services in the TERRITORY of HAWAII was receiving official attention. It was not until March 1st, 1901, however, that radio stations on the island were opened for business, the apparatus being supplied with power by Marconi induction coils. On October 15th, 1908, a 10-kw. station was erected at Kahuku Point, in Oahu (Hawaii), and at that time this was probably the most powerful station on the Pacific. Uninterrupted night communication was established with the wireless station on Telegraph Hill, San Francisco, California, a distance of 2,100 miles. This constituted the first direct radio communication between Hawaii and the U.S.A. On April 1st, 1915, a wireless service was established between the station at Wahiawa, Oahu (Hawaii), and the United States Naval Station at Tuluila, Samoa (2,400 miles distant). A composite system of equipment was used, with a transformer input of 6 kw., and a reliable nightly service has been maintained ever since.

In the TERRITORY of ALASKA radio communication takes the place of wired telegraph and telephone services. The large fish-canning companies rely almost exclusively upon their radio installations for communication between their canning plants, and for the maintenance of touch with their vessels engaged in this industry. Static interference or atmospherics is practically unknown there.

The following statistics illustrate the present extensive use of radiotelegraphy in the U.S.A.

SHIP STATIONS.

Class.	Number of stations.
Government	470
Commercial	838
Total	1,308

LAND STATIONS.

Class.	Government.	Commercial.	Totals.
United States proper ...	88	97	185
Alaska	20	28	48
Porto Rico	1	1	2
Canal Zone	3	—	3
Guam	1	—	1
Samoa	1	—	1
Hawaii	2	8	10
Philippine Islands ...	19	—	19
Special amateur stations ...	...	...	88
Experimental stations ...	...	...	75
Technical and training school stations ...	...	...	47
General and restricted amateur stations ...	...	...	6,089*

* Transmitting stations only. In addition there are several thousand receiving stations in the United States of which the Bureau has no record, such stations not being required to be licensed.

These figures are of April 1st, 1917.

It is to be noted that all of these stations, with the exception of ship stations and certain commercial land stations, are now closed because of the present restrictions.

In practically every city of any size in the United States there are one or more radio clubs, composed of men interested in radiotelegraphy from a scientific standpoint, practical radio men, and amateur radio experimenters.* The most important of these clubs is the Institute of Radio Engineers (particulars regarding which may be obtained from the Year Book published in New York by the Institute.

The items published in the following pages are :—

A—Synopsis of Wireless Legislation.

B—Regulations thereunder.

C—Act to regulate Radio Communication, 13th August, 1912

D—Regulations, 1912.

E—Regulations dated July 1st, 1913.

F—Notice to Berne Bureau.

G—War Wireless Order, dated April 6th, 1917.

The Congress of the United States has delegated to the Department of Commerce the duty of the enforcement of the Wireless Communication Laws and the International Radio-telegraph Convention, and the work is handled through the Bureau of Navigation, Washington. The officers engaged in this duty are as follows :—Secretary of Commerce, William C. Redfield ; Assistant Secretary of Commerce, E. F. Sweet ; Commissioner of Navigation, E. T. Chamberlain ; Deputy Commissioner of Navigation, A. J. Tyrer ; Radio Inspector in Charge, W. D. Terrell. There are, in addition, fifteen inspectors and assistant inspectors, stationed at various districts established by the Bureau of Navigation.

SYNOPSIS OF WIRELESS LEGISLATION.

A In 1910 an effort to regulate radio communication in the United States was made, when a Bill was prepared and passed by the Senate. It was not reached on the House of Representatives calendar, and therefore did not become effective.

The first Act requiring radio-apparatus on certain passenger-carrying vessels was approved June 24th, 1910. Under this Act the Secretary of Commerce and Labour organised on July 1st, 1911, the radio service, composed of three inspectors, with headquarters at New York, N.Y., Baltimore, Md., and San Francisco, Cal.

The second Act, approved July 23rd, 1912, amended the above Act so as to cover all vessels navigating the ocean or the great lakes and licensed to carry or carrying 50 or more persons, including passengers or crew or both, with the exception of steamers plying between ports or places less than 200 miles apart. This Act also requires an auxiliary source of power independent of the vessel's main electric power plant, which will enable the sending set for at least four hours to send messages over a distance of at least 100 miles ; efficient communication between the operator in the radio room and the bridge ; and that the radio equipment must be in charge of two or more persons skilled in the use of such apparatus, one or the other of whom shall be on duty at all times while the vessel is being navigated, with the exception of cargo vessels, on which, in lieu of the second operator, a member of the crew competent to receive and understand distress calls and other calls indicating

* For a list of the Principal Clubs and Societies see special section of this volume, "Directory of Wireless Societies."

danger may be substituted to aid in maintaining a constant wireless watch, so far as required for the safety of lives.

The Act to regulate radio communication was approved August 13th, 1912. Under this Act transmitting stations and radio operators are licensed by the Secretary of Commerce. Transmitting stations are inspected to determine if they comply with the requirements of the law. Radio operators are examined in order to determine their qualifications.

In addition to the above-mentioned Acts, the Department also enforces the London International Radiotelegraphic Convention rules of 1912, to which the United States is a party.

On March 4th, 1913, the Act abolishing the Department of Commerce and Labour and creating the Department of Commerce and the Department of Labour became effective. The enforcement of the radio laws was placed under the jurisdiction of the Secretary of Commerce.

In the latter part of the calendar year 1913 the radio service was reorganised, and eight additional inspectors were appointed.

The present organisation is as follows :—

Bureau : Office Force. Radio Inspector in Charge and five clerks and stenographers.

First District : Headquarters, Boston, Mass.—One radio inspector and one clerk.

Second District : Headquarters, New York, N.Y.—One chief radio inspector, three assistant radio inspectors, and two clerks.

Third District : Headquarters, Baltimore, Md.—One radio inspector, two assistant radio inspectors (detailed to Norfolk, Va.), and one clerk.

Fifth District : Headquarters, New Orleans, La.—One radio inspector and one clerk.

Sixth District : Headquarters, San Francisco, Cal.—One radio engineer, two assistant radio inspectors, and one clerk.

Seventh District : Headquarters, Seattle, Wash.—One radio inspector and one clerk.

Eighth District : Headquarters, Detroit, Mich.—One assistant radio inspector.

Ninth District : Headquarters, Chicago, Ill.—One radio inspector and one clerk.

REGULATIONS.

(Including two Appendices lettered *A* and *B*.)

I. ADMINISTRATION.

1. The Department has established for the purpose of enforcing, through radio inspectors and others, the Acts relating to radio communication and the International Convention, the following districts with the principal office for each district at the custom house of the port named :

- (1) Boston, Mass.—Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut.

- (2) New York, N.Y.—New York (county of New York, Staten Island, Long Island, and counties on the Hudson River to and including Schenectady, Albany, and Rensselaer) and New Jersey (counties of Bergen, Passaic, Essex, Union, Middlesex, Monmouth, Hudson, and Ocean).
- (3) Baltimore, Md.—New Jersey (all counties not included in second district), Pennsylvania (counties of Philadelphia, Delaware, all counties south of the Blue Mountains, and Franklin County), Delaware, Maryland, Virginia, District of Columbia.
- (4) Savannah, Ga.—North Carolina, South Carolina, Georgia, Florida, Porto Rico.
- (5) New Orleans, La.—Alabama, Mississippi, Louisiana, Texas, Tennessee, Arkansas, Oklahoma, New Mexico.
- (6) San Francisco, Cal.—California, Hawaii, Nevada, Utah, Arizona.
- (7) Seattle, Wash.—Oregon, Washington, Alaska, Idaho, Montana, Wyoming.
- (8) Detroit, Mich.—New York (all counties not included in second district), Pennsylvania (all counties not included in third district), West Virginia, Ohio, Michigan (Lower Peninsula).
- (9) Chicago, Ill.—Indiana, Illinois, Wisconsin, Michigan (Upper Peninsula), Minnesota, Kentucky, Missouri, Kansas, Colorado, Iowa, Nebraska, South Dakota, North Dakota.

2. Radio inspectors are authorised to communicate directly in their respective districts with collectors of customs, and to co-operate with them in the enforcement of the laws.

3. Whenever practicable, the radio inspector shall satisfy himself on his visit before the departure of a steamer subject to the Act of June 24th, 1910, as amended July 23rd, 1912, that the radio apparatus is efficient and in good working order within the meaning of the Act. If the apparatus does not comply with the law, the radio inspector will furnish the master with the stub of Form 771 "inspection record," on which will be noted the particulars in which the apparatus does not comply with the law. Where apparatus is found to be in compliance with the law, the stub of Form 771 will not be detached.

4. Where a steamer subject to the Act is without the apparatus and the operators prescribed, or either of them, and is about to attempt to leave port, the radio inspector visiting the vessel shall—

(a) Notify the master of the fine to which he will be liable, and of the particulars in respect of which the law has not been complied with ;

(b) the radio inspector shall submit to the collector of customs of the port a written report stating the exact nature of the violation, the section of the law violated, and the penalties involved, and all of the circumstances in connection therewith which will be of service to the collector and to the Secretary of Commerce in determining what action shall be taken ;

(c) statements should be obtained from operators, ship officers, or other witnesses at the time the violation is discovered and should accompany the report to the collector of customs ;

(d) the collector of customs will report the case to the Secretary of Commerce in the usual manner as a navigation fine case.

5. The Act does not authorise the refusal of clearance in case of violation of its provisions, but specifically provides for the imposition of a fine in a sum not more than \$5,000.

6. The Act does not apply to a vessel at the time of entering a port of the United States. Radio inspectors and customs officers may, however, accept as evidence of the efficiency of the apparatus and the skill of an operator messages shown to have been transmitted and received by him over a distance of at least 100 miles, by day, during the voyage to the United States.

7. Collectors of customs and radio inspectors are enjoined that the reports required by paragraph 4 (c) of these regulations must be precise statements of the facts as the basis for proceedings by the United States Attorney.

8. Masters of vessels entering a port of the United States and expecting to leave under the Act of June 24th, 1910, as amended July 23rd, 1912, should file Form 753a "Radio declaration" (Appendix A) in duplicate with the customs officer at the time of entry. The customs officer will furnish one copy to the radio inspector in order that proper inspection of the radio equipment may be made before departure.

9. For each departure of a steamer under the Act of June 24th, 1910, as amended July 23rd, 1912, the master is required to furnish to the customs officer a certificate in the form of Appendix B (Form 753b) "Master's certificate of radio apparatus." Such certificates shall be retained in the files of the collectors of customs. The collector of customs will arrange for the collection of these certificates at all times.

10. In order to comply with Section 2 of the Act of July 24th, 1910, every land station open to general public service, and every station on board an American vessel of the first or second class engaged in the foreign trade or transoceanic service, shall have as a part of the station equipment a copy of the official Berne list and supplements thereto as issued.

2. OPERATORS.

1. In so far as licensed operators are concerned, a sharp distinction should be drawn between the Act of July 23rd, 1912, which requires apparatus and operators for radio communication on steamers, and the Act of August 13th, 1912, to regulate radio communication.

The Act of July 23rd, 1912, amending the Act of June 24th, 1910, is designed to promote safety at sea through the employment of apparatus and operators to transmit and receive distress calls and other calls relating to perils and aids to navigation. It provides that in the case of American and foreign vessels subject to its provisions "the radio equipment must be in charge of two or more persons skilled in the use of such apparatus." This Act does not require that the operators shall be licensed, and the penalty prescribed in Section 3 of the Act is not incurred by the master of a vessel whose operators are "skilled in the use of such apparatus," even though they may not be licensed.

The Act of August 13th, 1912, is designed to execute in behalf of the United States the International Radiotelegraphic Convention and thus

to promote orderly exchanges by radio communication. For this purpose the International Radiotelegraphic Convention (Service Regulations) provides that the service of the station on shipboard shall be carried on by a telegraph operator holding a certificate issued by the Government to which the vessel is subject.

Section 3 of the Act of August 13th, 1912, carries out this provision of the International Convention by providing licences for operators on American vessels. If an unlicensed person serves in charge or in supervision of the use and operation of the apparatus both he and his employer are liable to a fine of not more than \$100 or imprisonment for not more than two months or both. This section and penalty do not apply to operators on foreign ships. But operators on the ships of foreign nations signatory to the International Radiotelegraphic Convention, as shown above, are required to have certificates or licences from their own Governments, and if not so certificated, the obligations of the convention have not been observed. The convention in the Service Regulations provides for this situation.

The Act of July 23rd, 1912, as stated, requires that on American and foreign ships the operators must be "skilled in the use of such apparatus," but does not require that they must be licensed. To facilitate commerce and simplify administration, operators presenting American licences or foreign certificates are accepted as "skilled in the use of such apparatus," except where there may be special reasons to doubt the operator's skill or reliability. Where operators on American or foreign ships do not have such licences or foreign certificates, radio inspectors or customs officers under the Act of July 23rd, 1912, may accept other competent evidence of skill or may examine such operators.

2. The Service Regulations of the International Convention require that—

The service of the station on shipboard shall be carried on by a telegraph operator holding a certificate issued by the Government to which the vessel is subject.

Such certificate shall attest the professional efficiency of the operator as regards—

(a) Adjustment of the apparatus and knowledge of its functioning.

(b) Transmission and acoustic reception at the rate of not less than 20 words a minute (Continental Morse) for commercial first-grade operators and not less than 12 words per minute for second-grade operators.

(c) Knowledge of the regulations governing the exchange of wireless telegraph correspondence.

(d) The certificate shall furthermore state that the Government has bound the operator to secrecy with regard to the correspondence.

3. The International Convention has been ratified by the principal maritime nations, dominions, and provinces. Radio operators holding valid certificates issued by foreign Governments which are parties to the convention will be recognised by this Department as persons "skilled in the use of such apparatus" within the meaning of the Act, unless in the case of a specific individual there may be special reason to doubt

the operator's skill and reliability. Such certificates should be ready at hand for the inspection of radio inspectors or customs officers before the steamer departs from the United States.

4. In the case of a vessel subject to the Act under the flag of any nation not a party to the International Convention, the radio operator, before the departure of the vessel from the United States, must furnish to the inspector evidence that he is "skilled in the use of the apparatus." This evidence shall consist of an examination on board by the radio inspector.

5. The Department of Commerce issues licences to radio operators certifying the degree of knowledge of radio-telegraphy possessed by them and their ability as operators, under the International Convention. Examinations for operators' licences can be taken at the following points: The United States Navy Yards at Boston, Mass., Brooklyn, N.Y., Philadelphia, Pa., Norfolk, Va., Charleston, S.C., New Orleans, La., Mare Island (San Francisco), Cal., Puget Sound, Wash.; at the Naval stations at Key West, Fla., San Juan, P.R., Honolulu, Hawaii, and Colon, Republic of Panama; also at Fort Wood, New York Harbour, Fort Leavenworth, Kans.; School for Enlisted Specialists, Fort Monroe, Va., and the Army station at Fort Valdez, Alaska; also at the Bureau of Standards and Bureau of Navigation, Washington, D.C.; and by the Department's radio inspectors at the custom houses in their districts and elsewhere, if practicable, by arrangement with them.

Applicants for licences should communicate in advance with the commandants or commanding officers of the Navy yards or Army posts or Naval or Army stations named, or with the Director of the Bureau of Standards, or with the Commissioner of Navigation, or with the radio inspectors at the custom houses in regard to examinations. In emergencies arrangements for the examination of ship operators can be made on short notice with the naval stations or radio inspectors in different ports. An effort should be made to arrange beforehand for any desired examination.

The operators' licences will be delivered to the successful applicants at the time of examination, or as soon thereafter as possible. The operator's licence is not valid, nor will it be signed by the examining officer, until the oath has been accomplished.

The licence provides that the holder shall take the oath for the preservation of the secrecy of messages before a notary public or other officer authorised to administer oaths.

6. An operator's licence may be granted to any person without regard to sex, nationality, or age, if the applicant can fulfil the requirements for the class of licence desired. Although no stated experience is required, the examinations for the different grades are such as require a proper amount of experience to pass.

The requirements which applicants must meet to secure licences of the several grades and scope and limitations of employment authorised by the licences of the several grades are as follows:—

Commercial extra first grade.—

(a) These licences will be given consideration by the Civil Service Commission in examinations for positions requiring

knowledge of radio telegraphy, when experience is rated as a part of such examinations.

(b) Applicants for the commercial extra first-grade licence must pass a special examination. To be eligible for this examination they must hold commercial first-grade licences, and their certificates of skill in radio communication, issued under the Act of June 24th, 1910, or licences under the Act of August 13th, 1912, must record eighteen months' satisfactory commercial service at sea or at land stations, either or both, during the two years previous to the filing of the application for examination, as shown by indorsement on the licence service records, or other satisfactory evidence, and provided that the applicants have not been penalised for a violation of the radio laws and regulations.

(c) A speed of at least thirty words per minute, Continental Morse, and twenty-five words per minute, American Morse (five letters to the word), must be attained. The technical questions and the questions on the radio laws and regulations will be considerably wider in scope than those for commercial first grade, and a higher percentage will be required.

(d) All examination papers, including the code test sheets, will be marked and forwarded to the Commissioner of Navigation, with a recommendation by the radio inspector or examining officer. Examination papers will be marked upon the basis of 100, and licences will be recommended only if 80 or better is attained.

(e) Licences of this grade will be issued by the Commissioner of Navigation, indorsed by the Secretary of Commerce, and delivered to the successful applicant through the examining officer.

Commercial first grade.—The applicant must pass a satisfactory examination in—

(a) The adjustment, operation, and care of the apparatus, including correction of faults and change from one wave to another.

(b) Transmitting and receiving by ear at a speed of not less than 20 words a minute in Continental Morse Code (five letters, numerals, or other characters to the word).

(c) Use and care of storage battery or other auxiliary power apparatus.

(d) Knowledge of the international regulations applying to radio communication in force.

(e) Knowledge of requirements of the Acts of Congress to regulate radio communication.

Commercial second grade.—The applicant must pass a satisfactory examination in all the subjects prescribed above for the first grade, with the exception that the minimum speed in transmitting and receiving shall be not less than 12 words in Continental Morse Code, and the examination in the subjects will not be as comprehensive as that given first-grade operators.

Commercial cargo grade.—The examination should be conducted so as to determine the following facts:—

(a) That the applicant is sufficiently familiar with the Continental Morse Code to recognise the distress signal (SOS) when

included in a list of other words or signals sent slowly (approximately five words a minute).

(b) That the applicant is sufficiently familiar with the Continental Morse Code to recognise the radio call letters of the vessel on which he desires to operate, when sent slowly and repeated several times.

(c) That the applicant is sufficiently familiar with the type of receiving apparatus of the vessel on which he desires to operate to determine by a buzzer or similar test that the detector or receiving apparatus is properly adjusted to receive signals.

Amateur first grade.—The applicant must have a sufficient knowledge of the adjustment and operation of the apparatus *which he wishes to operate*, and of the regulations of the International Convention and Acts of Congress in so far as they relate to interference with other radio communications, and impose certain duties on all grades of operators. The applicant must be able to transmit and receive in Continental Morse at a speed sufficient to enable him to recognise distress calls or the official "Keep out" signals. A speed of at least five words per minute must be attained (five letters, numerals, or other characters to the word).

7. *Renewal of licences.*—

(a) Renewal licences may be issued to commercial grade operators without examination, provided the service records on the backs of licences properly certify to three months' satisfactory commercial service during the last six months of the licence term. If expired licences have been lost or destroyed, an affidavit must be submitted attesting the facts regarding the manner in which the licence was lost. In such cases evidence of the required satisfactory commercial service may be submitted in the form of letters, signed by masters and employers.

(b) Operators holding licences of grades other than commercial, who submit satisfactory evidence to the examining officer, showing actual operation of radio apparatus for three months during the last six months of the licence term, may be issued new licences without examination. Otherwise, applicants for renewals will be examined in the usual manner.

(c) Renewals or new licences may be issued a reasonable length of time previous to the expiration of existing licences, but must bear the exact date of issue, which must correspond with the date on the back of Form 756 forwarded to the Commissioner of Navigation.

(d) Operators who fail to apply for renewal of their licences on or prior to the date of expiration must be re-examined. If, because of circumstances over which the applicant has no control, an operator is unable to apply for renewal of licence on or prior to the date of expiration, an affidavit may be submitted to the Commissioner of Navigation through the radio inspector or examining officer, attesting to the facts, which will be considered by the Commissioner of Navigation, who will advise the radio inspector or examining officer in regard to the issue of a renewal of the licence without re-examination.

(e) Service records must be completed and signed only by masters, employers, or the duly authorised agents of either.

(f) Any improper alteration of the service record, or the forgery of masters' or employers' signatures, constitutes a violation of the regulations, and the operator may suffer suspension of licence for a period not exceeding one year, at the discretion of the Secretary of Commerce.

8. *Temporary permits*.—Section 3 of the Act of August 13th, 1912, provides :—

In case of emergency, the Secretary of Commerce may authorise a collector of customs to issue a temporary permit, in lieu of a licence, to the operator on a vessel subject to the Radio Ship Act of June 24th, 1910.

The permits should be issued only to persons who the collector of customs has reason to believe are skilled in the use of the apparatus, but have not had the opportunity to present themselves for examination before Government officers authorised to conduct examinations and furnish licences. The temporary permit is valid for one trip only. The collector of customs will forward to the Department of Commerce (Bureau of Navigation) a report covering each temporary permit issued and the reasons for its issue.

9. *Ship stations* on vessels of the United States are classed under the Act of August 13th, 1912, as follows :—

Class A.—Ocean passenger steamers which are required to carry at least two operators and maintain a constant skilled watch. On vessels of this class carrying or licensed to carry less than 100 passengers one operator should hold the commercial first-grade licence and the other may hold a second-grade licence. Vessels of this class carrying or licensed to carry 100 or more passengers and under the London Convention vessels having constant service should have at least two operators, each holding commercial first-grade licences.

Class B.—Cargo steamers which have crews of 50 or more are required to carry two operators, one holding a second-grade commercial licence or higher ; the second may be a member of the crew holding a cargo or amateur first-grade operator's licence, requiring a transmitting and receiving ability of at least five words per minute. Vessels of this class maintain a constant receiving watch, but the transmitting service may be during limited hours as required by the vessel.

Class C.—Vessels of this class are those voluntarily equipped with radio apparatus and not subject to the Act quoted herein. The vessels have no fixed hours of service, but should be provided with at least one operator holding a commercial first or second-grade licence.

The following-named vessels come in this class :—

(1) Passenger steamers where the licensed capacity and number of crew combined number less than 50.

(2) Cargo steamers with crews less than 50.

(3) Tugs and towing steamers, etc., with crews less than 50.

(4) Motor vessels or yachts.

(5) Sailing vessels and barges.

(6) Steam yachts with crews less than 50.

(7) Steamers of any kind plying between ports or places less than 200 miles apart.

3. APPARATUS.

1. When the radio apparatus is certified as complying with the requirements of law by the competent authorities of a foreign Government, such certificate will be recognised by this Department, but the radio inspector or customs officer may, if he deem it necessary or desirable, satisfy himself that the apparatus is in good working order.

2. Whenever practicable, the radio inspector shall satisfy himself on his visit before the departure of a steamer subject to the Act that the apparatus is efficient and in good working order within the meaning of the Act, and, if satisfied, he shall issue a certificate in the form in Appendix A. The duplicate of these certificates should be filed with the collector of customs as a record of the radio-equipment of vessels sailing from his port.

3. When inspection of the apparatus by a radio inspector or customs officer is not practicable, the master of the steamer may furnish to the visiting customs officer a certificate in the form of Appendix B. Such certificate shall be retained in the files of the collector of customs.

4. The current necessary to transmit and receive messages shall at all times while the steamer is under way be available for the radio operator's use.

5. An auxiliary power supply, independent of the vessel's main electric power plant, must be provided which will enable messages to be sent for at least four hours over a distance of at least 100 miles, day or night.

Storage battery sets of sufficient voltage and capacity to operate the regular motor generator or source of primary alternating current are recommended. A complete separate auxiliary set comprising power source and wireless equipment may be provided if the required results are obtained.

Attention is invited to the Act of Congress, approved October 22nd, 1914, effective on and after date of approval, amending Section 4472, Revised Statutes, and which reads as follows :—

" Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, that section forty-four hundred and seventy-two of the Revised Statutes of the United States of America be, and the same is hereby, amended by adding thereto the following provision :—

" " Provided, however, that nothing in the foregoing or following section of this Act shall prohibit the transportation and use by vessels carrying passengers or freight for hire of gasoline or any of the products of petroleum for the operation of engines to supply an auxiliary lighting and wireless system independent of the vessel's main power plant. Provided further, that the transportation or use of such gasoline or any of the products of petroleum shall be under such regulations as shall be prescribed by the board of supervising inspectors, with the approval of the Secretary of Commerce."

Regulations authorised by the last proviso of the amendment were adopted by an executive committee of the Board of Supervising Inspectors of Steam Vessels. These regulations, after approval, were

published in the Radio Service bulletin as an amendment to the Radio Laws and Regulations.

If an internal-combustion engine is provided as the only means of auxiliary power supply to operate the radio equipment, under the Act of June 24th, 1910, amended July 23rd, 1912, it will be necessary for radio inspectors to determine if the equipment is efficient under the Ship Act, and in accordance with the regulations governing radio communication.

Until such regulations are approved, gasoline may not be carried except with the approval of the Secretary of Commerce in each case, and then subject to change to meet such requirements as may be later promulgated.

6. Efficient communication between the radio room and the bridge must be maintained. A speaking tube or telephone will comply with this requirement. A bell and messenger service will not be acceptable unless there are special conditions justifying this equipment. The speaking tube or telephone must terminate in the radio room and on the bridge, or in the chart room if readily accessible from the bridge. If the radio room is adjacent to or accessible from the bridge so that orders may be transferred direct, no means of communication will be required. Any arrangement calling for the services of a third person to transmit the message will not be satisfactory. The radio inspectors will notify the ship authorities whether the means of communication provided is satisfactory at the time of inspection.

7. One extra pair of head telephones, extra cords, and extra detectors should always be kept on hand.

8. A storage battery voltmeter, hydrometer, a supply of electrolyte, and distilled water should be a part of the regular equipment, but are not prescribed in terms by statute. The absence of these and similar inexpensive emergency articles will be brought to the attention of the master and of the company installing the apparatus by the radio inspector, in writing, and if after a reasonable interval they have not been supplied the inspector will communicate the fact to the Commissioner of Navigation.

N.B.—Under the provisions of Section 4405, Revised Statutes of the United States, the Board of Supervising Inspectors, Steamboat-Inspection Service, at a regular annual meeting held in Washington, D.C., on March 16th, 1915, adopted the following resolution amending the General Rules and Regulations, containing provisions for auxiliary lighting and wireless systems, in pursuance of an Act of Congress approved October 22nd, 1914, amending Section 4472, Revised Statutes.

These amendments to the rules having received the approval of the Secretary of Commerce on March 17th, 1915, have now the force of law and must be observed accordingly.

The resolution referred to reads as follows:—

“That the following be made Section 7, Rule IX., Ocean and Coastwise, Section 6, Rule XI., Lakes, Bays, and Sounds, and Section 6, Rules XI., Rivers:

“Vessels carrying passengers or freight for hire permitted under the authority of the Act of Congress approved October 22nd, 1914, amending Section 4472, Revised Statutes of the United

States, to transport and use gasoline or any of the products of petroleum for the operation of engines to supply an auxiliary lighting and wireless system independent of the vessel's main power plant, shall be allowed to carry not to exceed 40 gallons of gasoline or any of the products of petroleum for such purposes when contained in a seamless steel tank, cylindrical in form, not less than one-fourth (.25) of an inch thick, and of a capacity of at least 10 per cent. more than the volume of the contents. The tank shall be tinned on the inside and tested to 300 pounds pressure to insure tightness, and fitted with a vent pipe of ample capacity, with no angles in pipe greater than 45°, opening to the atmosphere at a point not less than 10 feet above the highest house, the vent pipe to end with a U bend with the opening protected by wire gauze. The filling pipe or cap shall be entirely independent of other connections. The tank shall be carried on the highest deck of the steamer and so located that there may be a free circulation of air all round it.

"Steamers engaged in transoceanic service or on voyages of more than ten days' duration in either direction may carry such quantities of gasoline or any of the products of petroleum as may be necessary to supply an auxiliary service already installed, the tanks already installed and the location of same being allowed for this purpose. On steamers where the auxiliaries are maintained by engines using the heavy oils, the oil may be carried in quantities not to exceed fifteen tons, when contained in iron or steel tanks of sufficient strength to withstand the action of sea or temperature, and so located as to be properly insulated or ventilated if either is necessary.

"All tanks shall be firmly and properly secured to prevent being torn away from beds or saddles by heavy weather or excessive list of the ship, and shall be the object of daily inspection by the officers of the ship intrusted with their care.

"There shall be placed within five feet of every tank containing gasoline, benzine, or naphtha not less than two fire extinguishers of approved type which have demonstrated a capacity for extinguishing burning gasoline, which fire extinguishers shall be in addition to the fire extinguishers already required."

4. CONSTANT WATCH.

On vessels of the United States it is the statutory duty of the master to see that one operator is on duty at all times. The radio service of the ship is under the supreme authority of the master.

5. MISCELLANEOUS.

1. The amended Act applies to vessels licensed to carry as well as those actually carrying 50 or more persons, ect,
2. Distances under the Act are to be computed in nautical miles.

6. ADDITIONS OR AMENDMENTS.

Additional or emendatory regulations will be issued from time to time as they may appear necessary.

APPENDIX A.—*RADIO SERVICE FORM 753A.*

RADIO DECLARATION.

(To be submitted in duplicate.)

DEPARTMENT OF COMMERCE.

Bureau of Navigation.

Radio Service.

NOTICE.—“ The radio equipment must be in charge of two or more persons skilled in the use of such apparatus, one or the other of whom shall be on duty at all times while the vessel is being navigated. Such equipment, operators, the regulation of their watches, and the transmission and receipt of messages, except as may be regulated by law or international agreement, shall be under the control of the master, in the case of a vessel of the United States ; and every wilful failure on the part of the master to enforce at sea the provisions of this paragraph as to equipment, operators, and watches shall subject him to a penalty of one hundred dollars.”—*Act of July 23rd, 1912.*

PORT OF _____,

Date _____, 191—.

This is to certify that the _____, S.S. _____, of the
(Nationality.)

_____, of which I am master, entered this port on
(Name of company or line.)

_____, 191—, having in crew _____ persons and licensed
(Number.)

or certified to carry _____ passengers ; that the said vessel { is }
is not { }
(Number.)

equipped with radio apparatus as required by the Act of June 24th, 1910,
as amended July 23rd, 1912 ; that the radio station is in charge of
_____ properly licensed radio operators and the apparatus is in
(Number.)

{ efficient } condition.
{ inefficient }

_____,
Master or Agent.

This form should be filed in duplicate with the collector of customs at time of entry, who will furnish one copy to the radio inspector of the district on the date of entry in order that proper inspection may be made of the radio apparatus prior to the clearance of the vessel.

APPENDIX B.—*RADIO SERVICE FORM 753B.*

Master's Certificate of Radio Apparatus.

NOTICE.

The radio equipment must be in charge of two or more persons skilled in the use of such apparatus, one or the other of whom shall be on duty at all times while the vessel is being navigated. Such equipment, operators, the regulation of their watches, and the transmission and receipt of messages, except as may be regulated by law or international agreement, shall be under the control of the master, in the case of a vessel of the United States ; and every wilful failure on the part of the master to enforce at sea the provisions of this paragraph as to equip-

ment, operators, and watches shall subject him to a penalty of \$100. (Act of July 23rd, 1912.)

PORT OF _____, _____, 191—.

This is to certify that I have to-day examined the apparatus for radio communication on the S.S. _____, of which I am master, about to leave this port for _____, and I have found the same efficient and in good working order, as prescribed by the Act of June 24th, 1910, as amended by the Act of July 23rd, 1912.

(Signed) _____, Master.

AN ACT TO REGULATE RADIO-COMMUNICATION.

APPROVED AUGUST 13TH, 1912.

C *Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,* That a person, company, or corporation within the jurisdiction of the United States shall not use or operate any apparatus for radio-communication as a means of commercial intercourse among the several States, or with foreign nations, or upon any vessel of the United States engaged in interstate or foreign commerce, or for the transmission of radiograms or signals the effect of which extends beyond the jurisdiction of the State or Territory in which the same are made, or where interference would be caused thereby with the receipt of messages or signals from beyond the jurisdiction of the said State or Territory, except under and in accordance with a licence, revocable for cause, in that behalf granted by the Secretary of Commerce upon application therefor; but nothing in this Act shall be construed to apply to the transmission and exchange of radiograms or signals between points situated in the same State: *Provided*, That the effect thereof shall not extend beyond the jurisdiction of the said State or interfere with the reception of radiograms or signals from beyond said jurisdiction; and a licence shall not be required for the transmission or exchange of radiograms or signals by or on behalf of the Government of the United States, but every Government station on land or sea shall have special call letters designated and published in the list of radio stations of the United States by the Department of Commerce. Any person, company, or corporation that shall use or operate any apparatus for radio communication in violation of this section, or knowingly aid or abet another person, company, or corporation in so doing, shall be deemed guilty of a misdemeanour, and on conviction thereof shall be punished by a fine not exceeding \$500, and the apparatus or device so unlawfully used and operated may be adjudged forfeited to the United States.

SEC. 2.—That every such licence shall be in such form as the Secretary of Commerce shall determine, and shall contain the restrictions, pursuant to this Act, on and subject to which the licence is granted; that every such licence shall be issued only to citizens of the United States or Porto Rico or to a company incorporated under the laws of some State or Territory or of the United States or Porto Rico, and shall specify the ownership and location of the station in which said apparatus shall be used and other particulars for its identification and to enable its range to be estimated; shall state the purpose of the station, and, in case of a station in actual operation at the date of

passage of this Act, shall contain the statement that satisfactory proof has been furnished that it was actually operating on the above-mentioned date; shall state the wave length or the wave lengths authorised for use by the station for the prevention of interference and the hours for which the station is licensed for work; and shall not be construed to authorise the use of any apparatus for radio communication in any other station than that specified. Every such licence shall be subject to the regulations contained herein, and such regulations as may be established from time to time by authority of this Act or subsequent Acts and treaties of the United States. Every such licence shall provide that the President of the United States in time of war or public peril or disaster may cause the closing of any station for radio communication and the removal therefrom of all radio apparatus, or may authorise the use or control of any such station or apparatus, by any department of the Government, upon just compensation to the owners.

SEC. 3.—That every such apparatus shall at all times while in use and operation as aforesaid be in charge or under the supervision of a person or persons licensed for that purpose by the Secretary of Commerce and Labour. Every person so licensed who in the operation of any radio apparatus shall fail to observe and obey regulations contained in or made pursuant to this Act or subsequent Acts or treaties of the United States or any one of them, or who fail to enforce obedience thereto by an unlicensed person while serving under his supervision, in addition to the punishment and penalties herein prescribed, may suffer the suspension of the said licence for a period to be fixed by the Secretary of Commerce and Labour not exceeding one year. It shall be unlawful to employ any unlicensed person or for any unlicensed person to serve in charge or in supervision of the use and operation of such apparatus, and any person violating this provision shall be guilty of a misdemeanour, and on conviction thereof shall be punished by a fine of not more than \$100 or imprisonment for not more than two months or both, in the discretion of the court, for each and every such offence: *Provided*, That in case of emergency the Secretary of Commerce and Labour may authorise a collector of customs to issue a temporary permit, in lieu of a licence, to the operator on a vessel subject to the radio ship Act of June 24th, 1910.

SEC. 4.—That for the purpose of preventing or minimising interference with communication between stations in which such apparatus is operated, to facilitate radio communication, and to further the prompt receipt of distress signals, said private and commercial stations shall be subject to the regulations of this section. These regulations shall be enforced by the Secretary of Commerce and Labour through the collectors of customs and other officers of the Government as other regulations herein provide for.

The Secretary of Commerce and Labour may, in his discretion, waive the provisions of any or all of these regulations when no interference of the character above mentioned can ensue.

The Secretary of Commerce and Labour may grant special temporary licences to stations actually engaged in conducting experiments for the development of the science of radio communication, or the apparatus pertaining thereto, to carry on special tests, using any

amount of power or any wave lengths, at such hours and under such conditions as will ensure the least interference with the sending or receipt of commercial or Government radiograms, of distress signals and radiograms, or with the work of other stations.

In these regulations the naval and military stations shall be understood to be stations on land.

REGULATIONS, 1912.

D 1. *Normal Wave Length.*—Every station shall be required to designate a certain definite wave length as the normal sending and receiving wave length of the station. This wave length shall not exceed 600 metres or it shall exceed 1,600 metres. Every coastal station open to general public service shall at all times be ready to receive messages of such wave lengths as are required by the Berlin convention. Every ship station, except as hereinafter provided, and every coast station open to general public service shall be prepared to use two sending wave lengths, one of 300 metres and one of 600 metres, as required by the international convention in force: *Provided*, That the Secretary of Commerce and Labour may, in his discretion, change the limit of wave length reservation made by regulations 1 and 2 to accord with any international agreement to which the United States is a party.

2. *Other Wave Lengths.*—In addition to the normal sending wave length all stations, except as provided hereinafter in these regulations, may use other sending wave lengths: *Provided*, That they do not exceed 600 metres or that they do exceed 1,600 metres: *Provided further*, That the character of the waves emitted conforms to the requirements of regulations 3 and 4 following.

3. *Use of a "Pure Wave."*—At all stations if the sending apparatus, to be referred to hereinafter as the "transmitter," is of such a character that the energy is radiated in two or more wave lengths, more or less sharply defined, as indicated by a sensitive wave meter, the energy in no one of the lesser waves shall exceed 10 per cent. of that in the greatest.

4. *Use of a "Sharp Wave."*—At all stations the logarithmic decrement per complete oscillation in the wave trains emitted by the transmitter shall not exceed two-tenths, except when sending distress signals or signals and messages relating thereto.

5. *Use of "Standard Distress Wave."*—Every station on shipboard shall be prepared to send distress calls on the normal wave length designated by the international convention in force, except on vessels of small tonnage unable to have plants insuring that wave length.

6. *Signal of Distress.*—The distress call used shall be the international signal of distress: . . . — — — . . .

7. *Use of Broad "Interfering Wave" for Distress Signals.*—When sending distress signals, the transmitter of a station on shipboard may be tuned in such a manner as to create a maximum of interference with a maximum of radiation.

8. *Distance Required for Distress Signals.*—Every station on shipboard, wherever practicable, shall be prepared to send distress signals of the character specified in regulations 5 and 6, with sufficient power to enable them to be received by day over sea a distance of 100 nautical miles by a shipboard station equipped with apparatus for both sending and receiving equal in all essential particulars to that of the station first mentioned.

9. *"Right of Way" for Distress Signals.*—All stations are required to give absolute priority to signals and radiograms relating to ships in distress; to cease all sending on hearing a distress signal; and, except when engaged in answering or aiding the ship in distress, to refrain from sending until all signals and radiograms relating thereto are complete.

10. *Reduced Power for Ships near a Government Station.*—No station on shipboard, when within fifteen nautical miles of a naval or military station, shall use a transformer input exceeding one kilowatt, nor, when within five nautical miles of such a station, a transformer input exceeding one-half kilowatt, except for sending signals of distress, or signals or radiograms relating thereto.

11. *Intercommunication.*—Each shore station open to general public service between the coast and vessels at sea shall be bound to exchange radiograms with any similar shore station and with any ship station without distinction of the radio systems adopted by such stations, respectively, and each station on shipboard shall be bound to exchange radiograms with any other station on shipboard without distinction of the radio systems adopted by each station, respectively.

It shall be the duty of each such shore station, during the hours it is in operation, to listen in at intervals of not less than fifteen minutes and for a period of not less than two minutes, with the receiver tuned to receive messages of 300 metre wave lengths.

12. *Division of Time.*—At important seaports and at all other places where naval and military and private or commercial shore stations operate in such close proximity that interference with the work of naval and military stations cannot be avoided by the enforcement of the regulations contained in the foregoing regulations concerning wave lengths and character of signals emitted, such private or commercial shore stations as do interfere with the reception of signals by the naval and military stations concerned shall not use their transmitters during the first fifteen minutes of each hour, local standard time. The Secretary of Commerce and Labour may, on the recommendation of the department concerned, designate the station or stations which may be required to observe this division of time.

13. *Government Stations to Observe Division of Time.*—The naval or military stations for which the above-mentioned division of time may be established shall transmit signals or radiograms only during the first fifteen minutes of each hour, local standard time, except in case of signals or radiograms relating to vessels in distress, as hereinbefore provided.

14. *Use of Unnecessary Power.*—In all circumstances, except in case of signals or radiograms relating to vessels in distress, all stations shall use the minimum amount of energy necessary to carry out any communication desired.

15. *General Restrictions on Private Stations.*—No private or commercial station not engaged in the transaction of *bona fide* commercial business by radio communication or in experimentation in connection with the development and manufacture of radio apparatus for commercial purposes shall use a transmitting wave length exceeding 200 metres, or a transformer input exceeding one kilowatt, except by special authority of the Secretary of Commerce and Labour contained in the licence of the station: *Provided*, That the owner or operator of a station of the character mentioned in this regulation shall not be liable for a violation of the requirements of the third or fourth regulations to the penalties of \$100 or \$25, respectively, provided in this section unless the person maintaining or operating such station shall have been notified in writing that the said transmitter had been found, upon tests conducted by the Government to be so adjusted as to violate the said third and fourth regulations, and opportunity has been given to said owner or operator to adjust said transmitter in conformity with said regulations.

16. *Special Restrictions in the Vicinities of Government Stations.*—No station of the character mentioned in regulation 15 situated within five nautical miles of a naval or military station shall use a transmitting wave length exceeding 200 metres or a transformer input exceeding one-half kilowatt.

17. *Ship Stations to Communicate with Nearest Shore Stations.*—In general, the shipboard stations shall transmit their radiograms to the nearest shore station. A sender on board a vessel shall, however, have the right to designate the shore station through which he desires to have his radiograms transmitted. If this cannot be done, the wishes of the sender are to be complied with only if the transmission can be effected without interfering with the service of other stations.

18. *Limitations for Future Installations in Vicinities of Government Stations.*—No station on shore not in actual operation at the date of the passage of this Act shall be licensed for the transaction of commercial business by radio communication within fifteen nautical miles of the following naval or military stations—to wit: Arlington (Virginia); Key West (Florida); San Juan (Porto Rico); North Head and Tatoosh Island (Washington); San Diego (California); and those established or which may be established in Alaska and in the Canal Zone; and the head of the department having control of such Government stations shall, so far as is consistent with the transaction of governmental business, arrange for the transmission and receipt of commercial radiograms under the provisions of the Berlin convention of 1906 and future international conventions or treaties to which the United States may be a party, at each of the stations above referred to and shall fix the rates therefor, subject to control of such rates by Congress. At such stations, and wherever and whenever shore stations open

for general public business between the coast and vessels at sea under the provisions of the Berlin convention of 1906 and future international conventions and treaties to which the United States may be a party, shall not be so established as to ensure a constant service day and night without interruption; and in all localities wherever and whenever such service shall not be maintained by a commercial shore station within 100 nautical miles of a naval radio station; the Secretary of the Navy shall, so far as is consistent with the transaction of Government business, open naval radio stations to the general public business described above, and shall fix rates for such service, subject to control of such rates by Congress. The receipts for such radiograms shall be covered into the Treasury as miscellaneous receipts.

19. *Secrecy of Messages*.—No person or persons engaged in or having knowledge of the operation of any station or stations shall divulge or publish the contents of any messages transmitted or received by such station, except to the person or persons to whom the same may be directed, or their authorised agent, or to another station employed to forward such message to its destination, unless legally required so to do by the court of competent jurisdiction or other competent authority. Any person guilty of divulging or publishing any message, except as herein provided, shall, on conviction thereof, be punishable by a fine of not more than \$250 or imprisonment for a period of not exceeding three months, or both fine and imprisonment, in the discretion of the court.

20. *Penalties*.—For violation of any of these regulations, subject to which a licence under sections 1 and 2 of this Act may be issued, the owner of the apparatus shall be liable to a penalty of \$100, which may be reduced or remitted by the Secretary of Commerce and Labour, and for repeated violations of any such regulations the licence may be revoked.

For violation of any of these regulations, except as provided in regulation 19, subject to which a licence under section 3 of this Act may be issued, the operator shall be subject to a penalty of \$25, which may be reduced or remitted by the Secretary of Commerce and Labour, and for repeated violations of any such regulations the licence shall be suspended or revoked.

SEC. 5.—That every licence granted under the provisions of this Act for the operation or use of apparatus for radio communication shall prescribe that the operator thereof shall not wilfully or maliciously interfere with any other radio communication. Such interference shall be deemed a misdemeanour, and upon conviction thereof the owner or operator, or both, shall be punishable by a fine of not to exceed \$500 or imprisonment for not to exceed one year, or both.

SEC. 6.—That the expression "radio communication" as used in this Act means any system of electrical communication by telegraphy or telephony without the aid of any wire connecting the points from and at which the radiograms, signals, or other communications are sent or received.

SEC. 7.—That a person, company, or corporation within the jurisdiction of the United States shall not knowingly utter or transmit, or cause to be uttered or transmitted, any false or fraudulent distress signal

or call or false or fraudulent signal, call, or other radiogram of any kind. The penalty for so uttering or transmitting a false or fraudulent distress signal or call shall be a fine of not more than \$2,500 or imprisonment for not more than five years, or both, in the discretion of the court, for each and every such offence, and the penalty for so uttering or transmitting, or causing to be uttered or transmitted, any other false or fraudulent signal, call, or other radiogram shall be a fine of not more than \$1,000 or imprisonment for not more than two years, or both, in the discretion of the court, for each and every such offence.

SEC. 8.—That a person, company, or corporation shall not use or operate any apparatus for radio communication on a foreign ship in territorial waters of the United States otherwise than in accordance with the provisions of sections 4 and 7 of this Act and so much of section 5 as imposes a penalty for interference. Save as aforesaid, nothing in this Act shall apply to apparatus for radio communication on any foreign ship.

SEC. 9.—That the trial of any offence under this Act shall be in the district in which it is committed, or if the offence is committed upon the high seas or out of the jurisdiction of any particular State or district, the trial shall be in the district where the offender may be found or into which he shall be first brought.

SEC. 10.—That this Act shall not apply to the Philippine Islands.

SEC. 11.—That this Act shall take effect and be in force on and after four months from its passage.

N.B.—*The United States Court, at Norfolk (Virginia), has decided that vessels entering American ports for bunker coal only are not subject to the provisions of the U.S. Wireless Telegraph Act, making it compulsory for certain classes of vessels to carry wireless telegraph outfits.*

REGULATIONS

E

ISSUED ON JULY 1ST, 1913.

PART I. LICENCES—APPARATUS.

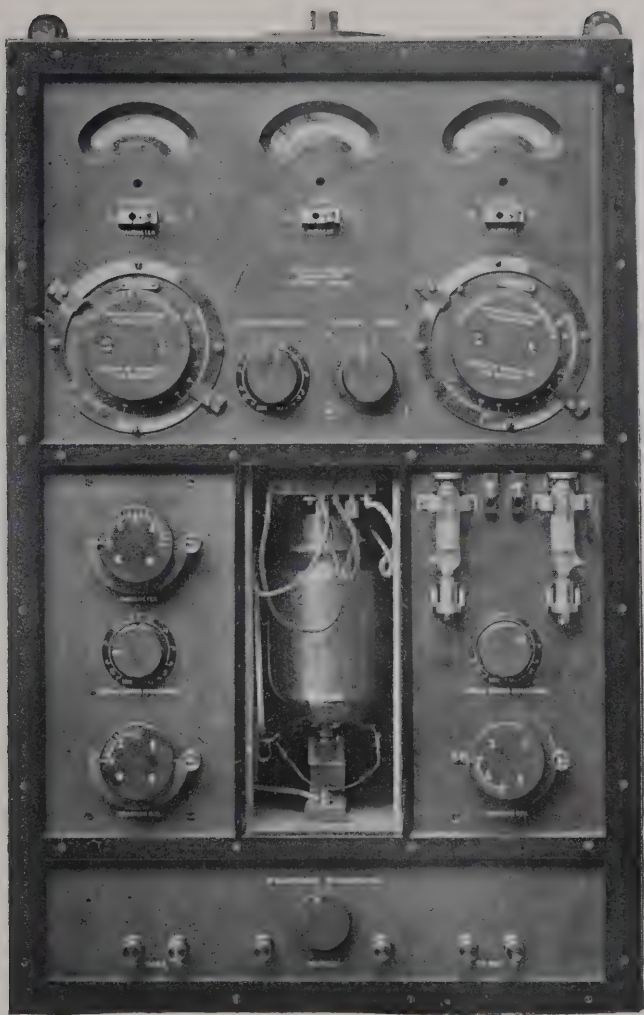
A. APPARATUS EXEMPT FROM LICENCE.

The Act does not apply either afloat or ashore to—

(a) Apparatus for radio communication which merely receives radiograms and is not equipped for sending.

(b) Apparatus for the transmission of radiograms exclusively between points in the same State, if the effect of such transmission does not extend beyond the State (so as to interfere with the radio communication of other States), or if the effect of such transmission does not interfere with the reception of radiograms from beyond the State (so as to interfere with the interstate radio communication of that State).

(c) Apparatus for radio communication which has been issued to the Organised Militia by the War Department or to the Naval Militia by the Navy Department, and is used for official purposes only.



C.W. VALVE-TRANSMITTER AND RECEIVER.

[To face page 516.]

The owner or operator of any apparatus who may be in doubt whether his apparatus, under this paragraph, is exempt from licence may write the facts to the radio inspector for his district or to the Commissioner of Navigation, Department of Commerce, Washington, D.C., before applying for a licence.

B. SHIP STATIONS.

The apparatus for transmission of radiograms, or signals on any vessel of the United States not permanently moored, requires a licence.

For the purposes of the administration of the Act, ship stations or vessels of the United States shall be of these classes :

Class A.—Ocean and Great Lakes passenger steamers subject to the Act of July 23rd, 1912, and required to carry two operators and maintain a constant skilled watch.

Class B.—Cargo steamers with crews of 50 or more, required to carry two operators, the second of whom may be a member of the crew certified as competent to receive distress calls, etc., maintaining a transmitting service during limited hours but a constant receiving watch.

Class C.—Vessels voluntarily equipped with radio apparatus and not subject to the Act of June 24th, 1910, as amended July 23rd, 1912, with no fixed hours of service, such as—

1. Passenger steamers, where the licensed capacity and number of crew combined are less than 50.

2. Cargo steamers with crews less than 50.

3. Tugs and towing steamers, etc., with crews less than 50.

4. Motor vessels, motor yachts.

5. Sailing vessels and barges.

6. Steam yachts with crews less than 50.

7. Steamers of any kind plying between ports or places less than 200 miles apart.

C. LAND STATIONS.

Apparatus for radio communication on land within the jurisdiction of the United States (excluding the Philippine Islands) and excluding apparatus of the Government of the United States) must be licensed if—

(a) The apparatus is a means of commercial intercourse among the several States or with foreign nations ; or

(b) The apparatus transmits radiograms or signals the effect of which at any time extends beyond the State ; or

(c) The apparatus interferes with the receipt of messages in any State from beyond such State.

For the purposes of the administration of the Act, stations on land are divided into two general descriptions, according to geographical location :

I. COAST OR SHORE STATIONS are stations which transmit messages to vessels at sea or on the Great Lakes or whose operations can affect the transmission of messages between ship and ship, or ship and coast. Vessels of the United States permanently moored are classed as coast stations under the International Convention.

II. INLAND STATIONS are stations which cannot transmit messages to vessels at sea or on the Great Lakes and whose operations cannot affect the transmission of messages between ship and ship, or ship and coast. This may be due to their geographical location or to their range, dependent on power and aerial, or conditions. In some instances actual inspection may be necessary to determine whether a station should be licensed as a coast station or an inland station.

An operator or owner in doubt as to the classification of his station should communicate the facts to the radio inspector of his district when applying for a licence.

As the means for enforcing the radio laws are limited, it is necessary to give ship and commercial stations precedence over amateur stations. The owner of an amateur station may operate his station in accordance with the laws if his application for a licence has been properly filed but has not been acted upon. An application for an operator's licence must also have been filed and every effort made to obtain the licence before the station may be operated.

"Provisional" station licences are issued to amateurs remote from the headquarters of the radio inspector of the district in which the station is located. These licences are issued as a matter of convenience and record. If, upon inspection, the station is found to comply with the law, the inspector will strike out the word "Provisional" and insert the date of inspection and his signature at the bottom of the licence.

If such a station is found not to comply with the law, the provisional licence may be cancelled until such time as the apparatus is readjusted to meet the requirements of the law: *Provided, however*, that consideration will be given to any reports of interference filed against such a station.

CLASSES OF LAND STATIONS.

Both coast stations (the words "coast stations," "shore stations," and "coastal stations" are used interchangeably) and inland stations are divided for the purposes of the administration of the Act into the following classes:—

1. Public-service stations, (a) general, (b) limited.
2. Limited commercial stations.
3. Experiment stations for the development of radio communication.
4. Technical and training school stations.
5. General amateur stations.
6. Special amateur stations.
7. Restricted amateur stations.

DESCRIPTION OF CLASSES.

1. (a) *Public-service stations, general*, are those open to general business between coast and ships or between land stations, and include those operated by common carriers under the Act of February 4th, 1887, to regulate commerce, amended June 18th, 1910. They are required to maintain a constant receiving service when open. Every coastal station open to public service shall at all times be ready to receive messages of such wave lengths as are required by the International

Convention in force. (Sec. 4, first regulation, Act of August 13th, 1912.)

Whenever such stations do not insure a constant service, transmitting and receiving day and night without interruption, the Secretary of the Navy is directed to open naval radio stations within 100 miles thereof to public business. (Sec. 4, 18th regulation, Act of August 13th, 1912.) The Secretary of War is authorised by the Act of May 26th, 1900 (31 Stat., 206), to open Alaskan military stations to public service.

1. (b) *Public-service stations, limited*, are reserved for a limited public service, determined by the object of the correspondence or other circumstances independent of the system employed. Stations of this class transmit and receive public messages to and from certain stations only, which are designated in the licence.

2. *Limited commercial stations* are not open to public service and are licensed for a specific commercial service or services defined in the licence. Stations of this class must not transmit to or accept public messages from other stations.

3. *Experiment stations*.—The Secretary of Commerce is authorised by section 4 of the Act to grant special temporary licences "to stations actually engaged in conducting experiments for the development of the science of radio communication, or the apparatus pertaining thereto, to carry on special tests, using any amount of power or any wave lengths, at such hours and under such conditions as will insure the least interference with the sending or receipt of commercial or Government radiograms, of distress signals and radiograms, or with the work of other stations." Applicants for such licences should state any technical result they have already produced, their technical attainments, etc. The fact that an applicant desires to experiment with his equipment does not justify or require a licence of this class. Most experiments can be made within the limitations of general and restricted amateur station licences or by use of an artificial antenna to prevent radiation.

4. *Technical and training school stations* will be licensed in a separate class, according to the degree of technical training attained and imparted and to local conditions.

5. *General amateur stations* are restricted to a transmitting wave length not exceeding 200 metres and a transformer input not exceeding 1 kilowatt. (Sec. 4, 15th regulation, Act of August 13th, 1912.)

6. *Special amateur stations* may be licensed by the Secretary of Commerce to use a longer wave length and a higher power on special application to the Secretary of Commerce. Applications for this class from amateurs with less than two years' experience in actual radio communication will not be approved. The application must state the experience and purpose of the applicant, the local conditions of radio communication, especially of maritime radio communication in the vicinity of the station, and a special licence will be granted only if some substantial benefit to the art or to commerce apart from individual amusement seems probable. (Sec. 4, 15th regulation, Act of August 13th, 1912.)

7. *Restricted amateur stations*, within five nautical miles of a naval or military station, are restricted to a wave length not exceeding 200 metres and to a transformer input not exceeding one-half kilowatt. (Sec. 4, 16th regulation, Act of August 13th, 1912.)

8. *Suspension of Service*.—Persons or corporations holding licences for radio stations, either land or ship, should notify the radio inspector for the district whenever the station or vessel goes out of commission for a period exceeding three months. The Commissioner of Navigation should be notified promptly of any intention to suspend or discontinue the service of any commercial station.

If there is no intention to resume the same service, or if the station or vessel will enter a different service from that indicated by the licence, the radio inspector will submit the licence to the bureau, together with a statement of the facts, so that the licence may be amended.

When the station goes into commission, the radio inspector will satisfy himself that the station corresponds to the schedule of the station as shown in the licence.

9. *Special stations for exceptional distances* are land stations designed (coast) to carry on transoceanic radio communication as between the United States and European countries, or between the Pacific coast and Hawaii, or from the United States over similar long distances at sea to another land station, or (inland) to carry on radio communication overland over exceptional distances. These stations will all come under one of the classifications named above, and the licence will indicate the stations for which communication is authorised and indicate the range.

10. *General Remarks*.—(a) General public service, limited public service, limited commercial, special amateur, and special stations which come under the classification of coast stations are subject to the same requirements as to the provision for receiving and relaying distress calls.

(b) Stations operated at different portions of the day for different purposes will require licences covering each purpose; that is, a station used during the day for limited commercial purposes and during the night for general public service will require two licences.

PART 2. LICENCES—OPERATORS.

The third section of the Act prescribes that every radio apparatus required to be licensed shall at all times while in use and operation be in charge or under the supervision of a person or persons licensed for that purpose by the Secretary of Commerce.

Licences approved and issued by the Secretary of Commerce to operators will be delivered to applicants after passing examinations given by the officers named under the head "Examination of operators for licences."

[NOTE.—*Apprentices*.—Under the supervision of a licensed operator an apprentice or unlicensed person may learn the art by the actual use of the apparatus, but the licensed operator who fails to enforce obedience to the regulations by the apprentice or unlicensed person serving under his supervision is liable to penalties as if he had himself violated the regulations.]

Operators' licences are divided into the following grades :—

I. Commercial :

1. Extra first grade.
2. First grade.
3. Second grade.
4. Cargo grade.
5. Temporary permit.

II. Amateur :

6. First grade.
7. Second grade.

III. Technical :

8. Experiment and instruction grade.

The requirements which applicants must meet to secure licences of the several grades and the scope and limitations of employment authorised by the licences of the several grades are as follows :—

I. COMMERCIAL.

Extra First Grade.—Special qualifications, for which see page 502-3.

First grade.—The applicant must pass a satisfactory examination in—

(a) The adjustment, operation, and care of the apparatus, including correction of faults and change from one wave length to another.

(b) Transmitting and receiving by ear at a speed of not less than 20 words a minute in Continental Morse (five letters, numerals, or other characters to the word).

(c) Use and care of storage battery or other auxiliary power apparatus.

(d) Knowledge of the international regulations in force applying to radio communication.

(e) Knowledge of the requirements of the Acts of Congress to regulate radio communication—sections 3, 4, 5, 6, and 7 of the Act of August 13th, 1912. No stated experience is required, but the examination given is such that a person must be familiar with all parts and principles embodied in a radio set and auxiliary power apparatus used, to obtain a licence.

(1) The commercial first-grade licence qualifies the operator for employment at any ship or land station of any class and is (apart from the special extra first grade license) the highest certificate indicative of ability as radio operator issued at this time.

(2) Every ship station of class A must carry two or more operators, at least one of whom must have a valid commercial first-grade licence, or, in the case of a foreign ship, have an equivalent foreign licence.

[NOTE.—The requirements for this grade are the same as the international requirements imposed on operators of foreign ships by international regulation, except the knowledge of the use and care, storage battery or other auxiliary and of the Act of August 13th, 1912. Inspectors will allow a reasonable time to foreign operators on foreign ships to meet the additional requirements, supplying them as promptly as practicable with copies of the Act of Aug. 13, 1912.]

(3) Every ship station of class A on a steamer carrying 100 or more passengers, and under the London Convention vessels having constant service, must carry at least two operators having commercial first-grade licences.

(4) Every land station open to general public service must have at least one commercial first-grade operator.

(5) Every coast station of class 1 must have commercial first-grade operators.

Second grade.—The applicant must pass a satisfactory examination in all the subjects prescribed above for the first grade, with the exception that the minimum speed in transmitting and receiving shall not be less than 12 words a minute in Continental Morse, and the examination in the subjects will not be as comprehensive as that given first-grade operators.

(1) An operator licensed as commercial second-grade, on subsequent compliance with the speed test for the first-grade, and further examination on the subjects named, may have his licence raised to the first grade by the indorsement in red ink on the face of his licence "Examined on [date] at [place] and passed first grade by [examining officer's signature]," or a first-grade licence may be issued.

(2) Every ship station under class A (except steamers carrying 100 or more passengers) must carry a second operator, having the commercial second-grade licence, or higher.

(3) Every ship station under classes B and C must carry at least one operator licensed as commercial second grade, or higher.

(4) Every coast station of classes 2 and 6 must have at least one operator holding a valid commercial second-grade licence.

Cargo grade.—Section 2 of the Act of July 23rd, 1912, provides :

On cargo steamers, in lieu of the second operator provided for in this Act, there may be substituted a member of the crew or other person who shall be duly certified and entered in the ship's log as competent to receive and understand distress calls or other usual calls indicating danger, and to aid in maintaining a constant wireless watch so far as required for the safety of life.

The examination will be conducted so as to determine the following facts :

(1) That the applicant is sufficiently familiar with the Continental Morse Code to recognise the distress signal (SOS), when included in a list of other words or signals sent slowly. (Approximately five words a minute.)

(2) That the applicant is sufficiently familiar with the Continental Morse Code to recognise the radio call letters of the vessel on which he desires to operate when sent slowly and repeated several times.

(3) That the applicant is sufficiently familiar with the type of the receiving apparatus of the vessel on which he desires to operate to determine by a buzzer or similar test that the detector or receiving apparatus is properly adjusted to receive signals.

Examining officers and radio inspectors are authorised to issue a certificate, in the form of an amateur first-grade licence, after examination, to indicate the facts above enumerated in the case of a member

of the crew or other person, and experience under this form will be credited by examining officers if the holder later applies for examination for a commercial licence. These licences will be marked "Cargo" in the upper right-hand corner under the serial number.

Temporary permit.—Section 3 of the Act of August 13th, 1912, provides :

In case of emergency the Secretary of Commerce may authorise a collector of customs to issue a temporary permit, in lieu of a licence, to the operator on a vessel subject to the radio ship Act of 1910.

The temporary permit is to be issued only in cases of emergency and will be valid for only one voyage. The collector will report in each case to the Commissioner of Navigation the circumstances which rendered necessary the issue of a temporary permit.

Radio operators holding licences of any grade or class and applying for examination for any other grade or class must submit to the examining officer an additional form, No. 756, in duplicate. If a new licence is issued, the licence held by the applicant must be surrendered.

II. AMATEUR.

General.—Amateurs, before applying for licences, should read and understand the essential parts of the International Radiotelegraphic Convention in force and sections 3, 4, 5, and 7 of the Act of August 13th, 1912. The Department recognises that radio communication offers a wholesome form of instructive recreation for amateurs. At the same time, its use for this purpose must observe strictly the rights of others to the uninterrupted use of apparatus for important public and commercial purposes. The Department will not knowingly issue a licence to an amateur who does not recognise and will not obey this principle.

First grade.—The applicant must have a sufficient knowledge of the adjustment and operation of the apparatus which he wishes to operate, and of the regulations of the International Convention and Acts of Congress in so far as they relate to interference with other radio communication and impose certain duties on all grades of operators. The applicant must be able to transmit and receive in Continental Morse, at a speed sufficient to enable him to recognise distress calls or the official "keep-out" signals. A speed of at least five words per minute (five letters to the word) must be attained. Applicants for licences of this grade residing at or near any place where examinations are held will communicate with examining officers and will be examined for licenses of amateur grades. At places remote from examining officers, applicants will file applications with the radio inspector, who will endeavour to arrange for examinations on his inspection trips.

Second grade.—The requirements for the second grade will be the same as for the first grade. The second-grade licence will be issued only where an applicant cannot be examined or until he can be examined. An examining officer or radio inspector is authorised in his discretion to waive an actual examination of an applicant for an amateur licence, if the amateur for adequate reasons cannot present himself for examination, but in writing can satisfy the examining officer or radio inspector that he is qualified to hold a licence and will conform to its obligations.

III. TECHNICAL.

Experiment and instruction grade.—The operator's licence for this grade is a commercial licence, endorsed by the Secretary of Commerce with a statement of the special purposes for which it is valid. It should be forwarded to the Commissioner of Navigation with a recommendation, if practicable, from a radio inspector or examining officer.

Experimenters and instructors of scientific attainments in the art of radio communication, whose knowledge of the radio laws satisfies the radio inspector or the examining officer, may obtain this grade licence, provided they are able to transmit and receive in the Continental Morse Code at a speed sufficient to enable them to recognise distress calls or the "keep-out" signals.

This licence has no reference to the instruction of radio operators as such, but is required by those operating apparatus licensed as experimental stations, but who are unable to obtain commercial-grade operators' licences.

PART 3. APPLICATIONS FOR LICENCES.

Station licences for the use and operation of apparatus for radio communication under the Act may be issued only to citizens of the United States or Porto Rico or to a company incorporated under the laws of some State or Territory or of the United States or Porto Rico.

Licences can be issued to clubs if they are incorporated or if a member will accept the responsibility for the operation of the apparatus, carrying with it the possibility of being penalised for infraction of the laws.

I. SHIP STATIONS.

Applications for licences for ship stations should be addressed to the radio inspector for the district, including the port whence the vessel usually departs.

The application by the company operating the apparatus should state the name of the ship in respect of which the licence is required. The radio inspector will then issue the Department's blank form of application for licence to be filled in by the applicant and returned to the radio inspector with a statement when the ship will be in port and its radio apparatus may be thoroughly inspected.

II. LAND STATIONS.

Coast stations.—The several classes of coast stations will be licensed, for reasons already assigned, in advance of inland stations.

Applications for licences for coast stations should be addressed to the Department's radio inspector for the district in which the station is located, who will forward the application Form 757.

All land stations, except general and restricted amateur stations, should state their location in latitude and longitude to seconds.

The application will state the class of the station for which a licence is desired, with particulars to show its proper classification, approximate transmitting range with a similar station, and precise location (State, county, city, or town, street and number, or, if outside of city or town limits, as exact a description of its locality as may be). A blank form for apparatus will be sent when Form 757 has been filed, and arrange-

ments made for inspection if necessary. Requests for licences for coast stations will be taken up in the order of classes, as indicated above, and in the order of date received only so far as the relative importance of stations will permit. Amateur applicants who state that they have read the International Radiotelegraphic Convention in force and the Act of August 13th, 1912, will receive attention before those who have not.

Inland stations.—The issue of licences to inland stations, as already defined, will be taken up after ship and coast stations. The procedure for application for licence will be the same as for coast stations.

III. FORMS.

(a) The several forms of applications and licences for operators will be issued through examining officers (through the War and Navy Departments) and radio inspectors. The licences will be numbered serially.

(b) The forms and licences for stations and apparatus will be issued through radio inspectors. Licences for general and restricted amateur stations are issued by them direct to applicant. Station licences of all other classes are issued from the office of the Commissioner of Navigation, Department of Commerce.

IV. COMMERCIAL OPERATORS.

Applications for operators' licences of the several commercial grades should be addressed to the nearest examining officer or radio inspector, who will arrange for examinations. Where the applicant is not within reasonable distance of an examining officer or radio inspector he may forward his application with a statement of the facts.

Holders of commercial extra first-grade radio operators' licences may be issued renewal of such licences without examination, provided the service records on the backs of the licences properly certify to twelve months' satisfactory service in a land or ship station open to general public service, at least six months of which must have been served during the last twelve months of the licence period.

However, holders of commercial extra first-grade licences now employed as radio inspectors, radio instructors, or similar occupations requiring exceptional qualifications where the duties require the testing, or demonstrating, or otherwise using commercial radio apparatus and the telegraph codes, may be issued renewals of their licences without re-examination, provided, in addition to the above, they can show satisfactory evidence of such service covering a period of eighteen months out of the two-year licence period. Where the applicant has not used regularly the telegraph codes, he will be given the code examination required in the original examination or, if he has used only one code, he will be examined in the code not used.

The service record shown on the licences must be transcribed on Form 756.

The licence may be marked "Expired" in red across the face and returned to the operator, if desired. The action taken should be noted on Form 756.

Where the record on the reverse side of the licence does not show the service performed, the evidence submitted as proof of such service must be transmitted to the Bureau with Form 756.

Transcriptions of code tests must be submitted to the Bureau.

Where applicants are at remote points or cannot proceed to examining offices efforts will be made to examine them through radio inspectors when they are in that vicinity, but special trips cannot be made for that purpose.

V. AMATEUR OPERATORS.

(a) Amateurs in the seaboard States should write to the nearest examining officer in their vicinity for Form 756 (application for operator's licence) and to the radio inspector in their vicinity for Form 757 (application for licence for land station). If the application for operator's licence is also made to the radio inspector, both applications should be forwarded in the same envelope.

(b) Amateur operators at points remote from examining officers and radio inspectors will be issued second-grade amateur licences without examination, as explained previously. Examinations for first-grade licences will be given by the radio inspector when he is in that vicinity, but special trips cannot be made for this purpose.

PART 4. GENERAL OBSERVATIONS.

1. An operator's licence may be granted to any person without regard to sex, nationality, or age if the applicant can fulfil the requirements for the class of licence desired.

2. No stated experience is required. The examinations for the different grades are such as require a proper amount of experience to pass.

3. The service regulations of the radiotelegraphic convention in force provides that "no station on shipboard shall be established or worked by private enterprise without authority from the Government to which the vessel is subject." Such authority shall be in the nature of a licence issued by said Government. Stations on foreign ships will be licensed by their Governments, respectively. Inspectors will report to the Commissioner of navigation stations on foreign ships not so licensed.

4. The lists of call signals when issued by the Department of Commerce may be obtained from the Superintendent of Documents, Government Printing Office, Washington.

5. Operator's licences should be framed and posted in the radio room, and licences for stations should be accessible at all times to inspectors.

6. Operator's licences should indicate on their face that the oath has been executed. This statement should be signed by a notary public.

7. Stations equipped to receive only do not require a licence.

8. No fees are charged for any operator or station licence.

9. Licensed stations require licensed operators.

10. Amateur stations within five miles of naval or military stations need not have been in actual operation on or before August 13th, 1912, to obtain a licence for a restricted amateur station.

11. Any person applying for a duplicate licence to replace an original which has been lost, mutilated, or destroyed, will be required to submit

an affidavit to the Bureau of Navigation through the radio inspector or examining officer issuing the original, attesting the facts regarding the manner in which the original was lost, mutilated, or destroyed.

The Commissioner of Navigation will consider the facts in the case and advise the radio inspector or examining officer in regard to the issue of a duplicate licence. A duplicate licence will be issued under the same serial number as the original and marked "Duplicate" in red across the face.

12. These instructions may be amended and supplemented from time to time.

NOTICE TO BERNE BUREAU.

F The Minister of Marine of the United States of America has notified to the Berne Bureau that the following information is to be published :—

1. The Departments of the United States Government which are concerned with wireless telegraphy regret that they have not yet been able to make arrangements with the land telegraph of the United States owing to the fact that these are in the hands of commercial companies, and have nothing to do with the Government. The idea was to arrange for the free transmission over the land telegraph, in accordance with Article 14, paragraph 2, of the Rules of Service of the London Convention. The information to be transmitted free of charge was all such as related to the date and the hour of the handing in of radiotelegrams on board ship. But the transmission of such information over land lines being subject to a tax, the Government of the United States cannot, at present, conform strictly to this rule of the Convention. The declaration of the American delegation contained in Article 2 of the Final Protocol made provision for such a possible outcome, although its exact nature was not actually set forth.

2. Multiple radiotelegrams, such as are mentioned in Article 38, paragraph 5, of the Rules of Service, will be accepted as multiple messages in all wireless transmission between ship and shore stations, but all the companies operating land telegraph lines in the United States will consider, and will charge for, a multiple wireless message as consisting of so many individual telegrams as the addresses it bears may indicate.

3. The United States is not a member of the International Telegraphic Union, and consequently is not bound to execute the rules laid down in Article 38, paragraph 8, of the London Convention Rules of Service concerning urgent radiotelegrams. The laws of the United States regulating all reciprocal arrangements between the States forbid the use of the privilege, and consequently all telegraph companies will not allow any priority in favour of telegrams for which any additional tax may have been paid.

WAR WIRELESS, ORDER.

DATED APRIL 6TH, 1917.

G The following is the text of the executive Order issued by President Wilson on the declaration of War by the U.S.A. It relates to the closing of American Wireless Stations.

WHEREAS the Senate and House of Representatives of the United States of America in Congress assembled, have declared that a State of war exists between the United States and the Imperial German Government; and WHEREAS it is necessary to operate certain radio stations for radio communication by the Government and to close other radio stations not so operated, to insure the proper conduct of the war against the Imperial German Government and the successful termination thereof. Now, therefore, it is ordered by virtue of authority vested in me by the Act to Regulate Radio-Communication, approved August 13th, 1912, that such radio stations within the jurisdiction of the United States as are required for naval communications shall be taken over by the Government of the United States and used and controlled by it, to the exclusion of any other control or use; and, furthermore, that all radio stations not necessary to the Government of the United States for Naval Communications may be closed for radio-communication.

The enforcement of this order is hereby delegated to the Secretary of the Navy, who is authorised and directed to take such action in the premises as to him may appear necessary.

This order shall take effect from and after this date.

(Signed) WOODROW WILSON.

The White House,
April 6th, 1917.

URUGUAY

THE independence of the Republic of Uruguay, originally part of the Spanish Viceroyalty of Rio de la Plata, and later on a Province of Brazil, was declared on August 25th, 1825, and recognised by Treaty on August 27th, 1828. The constitution was sworn on July 18th, 1830. Legislation is administered by a Parliament of two Houses, the Executive being in the hands of a President elected every four years. The total area of the nineteen departments in which the country is divided is estimated at 72,453 square miles. The capital city is Montevideo, situated on the northern bank of the River Plate Estuary.

The installation of wireless telegraphy in Uruguay was authorised by a Government Decree dated June 22nd, 1910. This selected the "Telefunken" system, and provided for one long-distance station at Montevideo, minimum range 500 miles; two situated respectively at Paso de los Toros and Rivera (Northern Frontier) with minimum range of 372 miles; two respectively situated at Lobos Island and the English Bank, each with minimum range of five miles; besides installations on the various Government vessels. By the end of the year 1911, the service (supplemented by two Military Field Stations) was in working order.

The Montevideo station, opened to the public in December, 1911, and standing on a hill three miles from the river, is the only installation doing international work. Its location is called Cerrito de la Victoria, and the wireless station generally goes by the name of "Cerrito." The installations situated at Rivera and Paso de los Toros are employed solely for military purposes, and only in times of crisis, should a breakdown of the ordinary wired service eventuate, are then used for public messages.

Wireless telegraphy in Uruguay is controlled by the Government, the department in charge being the Ministry of War and Marine. The Government ship stations (comprising the cruisers *Uruguay* and *Monte Video*, the gunboat *18 des Julio*, the transport *Baron de Rio Branco*, and the Government steamer *Oyarvide*) are also under the control of the Minister of War and Marine. There are no privately owned stations. All such installations and all amateur apparatus were prohibited at the beginning of the war by Government decree as being contrary to the laws of neutrality. There are no radiotelegraphic clubs or societies, in fact wireless telegraphy is entirely a Government monopoly.

The first decree regulating the subject was issued by the Ministry of War and Marine on September 5th, 1911, and was followed by a decree dated January, 1912. Under its provisions *all ships calling at the ports of the Republic and destined for Passenger Service are obliged to be fitted with wireless apparatus.*

The officials in charge of wireless telegraphy in Uruguay are the following :—

PUBLIC DEPARTMENTS CONTROLLING WIRELESS TELEGRAPH OPERATIONS.			
Official.	Title.	Address.	
Dr. Arturo Gaye	.. Acting <i>pro tem.</i> as Minister for War	Montevideo.	
Bernardo Kaye!	.. Engineer Inspector General..	Calle Pereira 74, Montevideo.	
Juan P. Camera..	.. Secretary	Calle Ituzaingo 1278, Montevideo.	
Lieut.-Col. Carlos Du Pre	Chief of Montevideo Station (Cerrito)	Montevideo.	
Cesar Vidal y Pineiro	.. Chief of Paso de los Toros Station	Paso de los Toros.	
Gualberto Oriel	.. Chief of Rivera Station	Rivera.	

We print below the text of both the decrees above referred to :—

A—Decree of September 5th, 1911.

B—Decree of January, 1912.

DECREE OF SEPTEMBER 5TH, 1911.

1. The National Wireless Telegraphy Office is under the **A** direct control of the Ministry of War and Marine, with the Engineer Inspector-General as its head.
2. The National Wireless Telegraphy Office is in charge of and controls all the radiotelegraphic stations, whether fixed or military moveable ones, on vessels or on lighthouses, together with their staff, apparatus and installations.
3. The Inspector-General will at such times and under such circumstances as he thinks proper, make visits of inspection of the stations in order to take personal cognisance of their requirements, and he exercises in regard to the staff, whether military or civil, the character of a staff commander.
4. On the occasions of manœuvres the Inspector-General will designate the country stations which are to take part in accordance with the instructions he receives as to the requirements of the occasion.
5. It is one of the duties of the National Wireless Telegraph Office to propose to the superior department the construction of fresh stations to report regarding the means for acquiring the same.

6. The Inspector-General controls the sums received for transmission of telegrams, which sums shall be deposited in the Bank of the Republic to the order of the Minister of War and Marine.

7. The National Wireless Telegraph Office will make contracts with the General Post and Telegraph Office and with the shipping companies to be submitted for approval to the Minister of War and Marine ; similarly the office is empowered to draw up with the administrations of the neighbouring States radiotelegraphic agreements with the object of improving and amplifying the international wireless telegraph service, all of which shall be submitted for approval by the higher department.

8. The Minister of War and Marine will notify the International Office in Berne of the creation of the National Wireless Telegraph Office in Uruguay, so that in future all questions concerning wireless telegraphy in Uruguay may be referred direct to it.

9. The Inspector-General will report quarterly to the Minister of War and Marine regarding the general conditions and working of the service under his charge, and will compile an annual memorandum upon the general work of his department.

DECREE OF JANUARY, 1912.

B 1. Commencing from May 1st of the present year (1912) all the ships carrying passengers between the harbours of the Republic and those of foreign countries shall be fitted with radio-telegraph installations.

2. The said installations shall be designed to receive and transmit telegrams up to a distance of not less than one hundred kilometres on the ships of river navigation, and four hundred kilometres on those of the oceanic navigation.

3. The installations shall be permanently kept in good conditions of working, and capable of intercommunicating with the stations of the Republic.

4. The stations shall be in charge of persons well acquainted with the use of radiotelegraph apparatus.

5. The service of the stations shall be entirely in accordance with the provisions of the International Radiotelegraph Convention.

6. The agents of the companies will inform, before expiration of the time fixed, the General Inspector of the National Services of Wireless Telegraphy of the characteristics, system, power, etc., of the radio-telegraph apparatus to be fitted on the ships of their companies.

7. The ships which after expiration of the time fixed by Article 1 have not complied with the provisions of this Decree, shall not be authorised to carry passengers in the harbours of the Republic.

8. Those ships which do not keep their wireless apparatus in proper working conditions shall be liable to have applied to them the penalty specified in the previous article (7).

9. The General Inspector of the National Service of Wireless Telegraphy is hereby entrusted with seeing that the provisions of this Decree are duly complied with.

VENEZUELA (UNITED STATES OF)

THE Republic of Venezuela was formed in 1830 by secession from the other members of the Republic of Colombia. The Constitution in force is that of June 13th, 1914. Legislative authority is vested in a Congress of two Chambers, whilst the Executive Power is exercised by a President in conjunction with Cabinet Ministers. The twenty states, two territories and one Federal district of which it is composed cover an area of 398,594 square miles.

At the time of going to Press there are no wireless stations within the confinement of the Republic, nor have the Government as yet decreed Laws and Regulations respecting radiotelegraphy. However, this state of affairs is unlikely to continue, and it is not insignificant that in June 1917 a School of Wireless Telegraphy was inaugurated on board the Venezuelan cruiser *Mariscal Sucre* at Puerto Cabello, although the teaching so far has been purely theoretical.

WEIHAIWEI

(See CHINA, FOREIGN SETTLEMENTS), page 247).

WEST INDIES (BRITISH)

THE Islands in the Caribbean Sea were given the title of *West India* by Columbus in 1492, because he then believed himself to have reached India by a westward sea route. Next to Newfoundland they are the oldest of British colonies, and—lying with regard to latitude between 10° and 27° N., and with respect to longitude between 59° 30' and 85° W.—extend in a semicircle from the south of Florida to the northern coast of South America. It is for this reason that British Guiana, although situated on the mainland, is included under this heading. They may be conveniently divided into five main groups:

(1) The Bermudas.

(2) The Bahamas.

(3) The Greater Antilles, of which Jamaica and the Cayman Islands are the British representatives.

(4) The Lesser Antilles, subdivided into:

(a) Barbadoes.

(b) The *Leeward Islands*, including Antigua, Barbuda, St. Kitts, Nevis, Anguilla, Dominica, Montserrat and the Virgin Islands.

(c) The *Windward Islands*, comprising Grenada, St. Lucia and St. Vincent.

(d) Trinidad and Tobago.

(e) Various small islets with no permanent population.

(5) British Guiana.

Of these colonies Jamaica, the Bahamas, Barbados, the Leeward Islands (whose administrative centre is located at St. John, Antigua), Grenada, St. Lucia, St. Vincent and Trinidad have issued Wireless Regulations which will be found below under the headings of the respective colonies.

(1) BERMUDAS (THE).

A BRITISH Colony with representative Government, consisting of a group of 360 small islands (about 20 inhabited) the Bermudas lie 520 miles east-North Carolina and 677 distant from New York. They are noted for their climate and scenery and constitute a favourite winter resort for Americans.

The area is a little under 20 square miles. The capital city is Hamilton. There are 167 miles of telephone wire under control of the military and fifteen of telegraph cable. The island is connected by cable with Halifax, Nova Scotia, with Turks' Island, and Jamaica.

Wireless telegraphy is administered under the following enactments :—

A—The Wireless Telegraph Act, 1903.

B—The Wireless Telegraph Act, 1909.

THE WIRELESS TELEGRAPH ACT, 1903.

A From and after the passing of this Act it shall not be lawful for any person in these islands to transmit or receive messages across the seas (*by an Act of 1910 this was amended by the addition of the words "or between places in these islands"*) by means of any wireless telegraphy, or to instal, erect, construct, establish, or maintain in these islands any instrument, apparatus, or other thing for the purpose of transmitting or receiving such messages, unless such person shall hold a written licence from the Governor authorising the same, and such licence shall be in force and unrevoked; and any person who shall offend against the provisions of this enactment shall be liable, on summary conviction before any two justices, for a first offence to a penalty not exceeding £25, and for a second or subsequent offence to a penalty not exceeding £100.

2. Any licence issued by the Governor under this Act may at any time be revoked by him by a written notice given to the person to whom such licence was issued, or by the publication of such revocation in the *Gazette*, and after such revocation such person shall not be entitled to any privilege or protection by virtue of such licence.

3. Any licence under this Act may be issued subject to such conditions and restrictions as the Governor may from time to time consider desirable in the public interest.

4. If any Justice of the Peace shall be satisfied from the information on oath of any credible person that there is good reason to believe that any of the provisions of the first section of this Act have been or are being violated, he may issue a search warrant to any constable or constables authorising and requiring him or them, with or without assistants, at any hour of the day or night, to enter into, and go through and search, inspect and examine any premises where such violation is suspected to have been or to be committed for the purpose of ascertaining whether such violation has been or is being committed; and if, upon such search, any instrument, apparatus, or other thing apparently used, or capable of being used, for the purpose of transmitting or receiving messages across the sea by wireless telegraphy shall be found, it shall be lawful for such constable or constables to seize and carry away, or otherwise to secure the same;

and if, upon a hearing before any two Justices of the Peace, they shall adjudge and determine that any such instrument, apparatus, or other thing, has been used, or is capable of being used, for either of the purposes aforesaid, they may adjudge the same to be forfeited, and such forfeiture may be in addition to any penalty which may be imposed on any person under this Act in respect of such instrument, apparatus, or other thing.

5. Any instrument, apparatus, or other thing which shall be adjudged to be forfeited under the provisions of this Act shall be sold or otherwise disposed of in such manner as the Governor shall direct, and if sold the net proceeds of such sale shall be paid into the public treasury, after payment thereof of such reward, if any, as the Governor shall award to the informer, or to any constable or constables executing the search warrant under which such articles were seized.

6. This Act shall continue in force until and throughout the last day of December, 1907. (*By the Wireless Telegraphy Act Continuing Act, 1907, the Act of 1903 is continued in force indefinitely.*)

1909.

The Governor having informed the Legislature that a **B** despatch has been received from the Secretary of State for the Colonies drawing attention to the desirability of making Regulations as to the use of Wireless Telegraphy apparatus on merchant ships, whether British or foreign, while in the territorial waters of these islands, it was deemed expedient to confer on the Governor in Council the power to make such Regulations as may be necessary for the purpose aforesaid, and the following Act came into force in March, 1909:—

1. It shall be lawful for the Governor in Council to make regulations as to the use of wireless telegraph apparatus on merchant ships, whether British or foreign, while in the territorial waters of these islands, for preventing such apparatus being worked so as to interfere with naval signalling, or with the working of any wireless telegraph station lawfully established or worked in these islands, or with the transmission of messages between any such station and ships at sea.

2. If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships whilst in the territorial waters of these islands shall be subject to such further regulations as may be made by the Governor from time to time, and such regulations may prohibit or regulate such use in all cases, or in such cases as may be deemed desirable.

3. Any regulations made under this Act may impose fines for any breach thereof not exceeding £20 for a single offence, and not exceeding £5 a day for a continuing offence, and such fines shall be recoverable with costs in any Court of Summary Jurisdiction consisting of any two Justices of the Peace.

4. All regulations made under this Act shall become operative on the date of their publication in the *Gazette*, or on such later date as shall be fixed by the regulations for the purpose.

(2) BAHAMAS.

THE Bahamas (or Lucayos) are an archipelago of the British West Indies, lying between $21^{\circ} 42' - 27^{\circ} 34' N.$ lat. and $72^{\circ} 40' - 79^{\circ} 5' W.$ long., and extending from the coast of Florida on the north-west to Haiti on the south-east.

There is but one radio station in the colony, and that has been located in Nassau, New Providence. It was installed on August 28th, 1913, is owned by the colony, and controlled under the authority of the Governor in Council.

It is operated by the Telegraph Department under the supervision of

Mr. P. H. Burns, Superintendent and Electrical Engineer. The Wireless Telegraph Act, 1902, of which a copy appears in the current issue of THE YEAR-BOOK OF WIRELESS TELEGRAPHY, 1917, has been superseded by the Radiotelegraph Act, 1913, a copy of which is subjoined.

AN ACT

To amend the Law relating to the Telegraph Department of the Colony.

(Assented to on July 7th, 1913.)

MAY it please the King's Most Excellent Majesty that it may be enacted and be it enacted by His Excellency George Basil Haddon-Smith, Esquire, Companion of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the Bahama Islands, the Legislative Council and Assembly of the said Islands, and it is hereby enacted and ordained by the authority of the same as follows :

1. This Act may be cited as The Telegraph Department Act 1913.

2. (1) The Telegraph Department shall consist of the Officers set out in the First Schedule to this Act. They shall be appointed by the Governor and shall hold office during pleasure and shall receive annually the respective salaries at the amounts and in the manner set out in the First Schedule to this Act. Provided that the persons holding such offices at the commencement of this Act shall continue to discharge the duties of such offices and to receive the emoluments thereof without the necessity of new appointment, and their services under this Act shall be deemed to be in continuance of their services under any other Act for the purposes of any Act relating to pension or leave of absence or sick leave. Provided also that Patrick Henry Burns, the present holder of the office of Superintendent of Telegraphs and Electrical Engineer, shall continue to receive a salary at and after the rate of £400 a year.

(2) The annual increase of salary provided for in the First Schedule to this Act in the cases of the Clerk and the Operators shall be granted solely at the discretion of the Governor in Council and shall not be granted by him unless and until the Superintendent of Telegraphs and Electrical Engineer certifies that the officer eligible for the increase of salary is thoroughly efficient and reliable in the discharge of the duties of his office and has discharged such duties in a highly satisfactory manner. Provided that in the case of the present holder of the office of Clerk the salary of that officer may be increased annually by sums not exceeding £10.

(3) In case of emergency the Governor may, with the approval of the Executive Council, appoint temporarily assistant operators under such terms and conditions and at such salaries as the Governor in Council may prescribe and determine, and any such salaries shall be paid out of the Treasury by warrant in the usual manner. Provided that no such appointment shall be for a longer period than six months.

(4) The Superintendent of Telegraphs and Electrical Engineer may with the approval of the Governor in Council select and train such number of probationers, being British subjects, as the Governor in Council may determine with a view to the subsequent employment of such probationers under this Act if occasion shall so require and the Governor in Council shall think fit. No probationer shall be entitled to any payment.

3. No person other than a British subject shall be appointed to any office under this Act.

4. Any person appointed under this Act shall, in addition to any oath required by any Act, take such oaths of secrecy as may be prescribed by any Rules made under The Telegraph Acts 1891 to 1913.

5. The Acts set out in the Second Schedule to this Act shall be and the same are hereby repealed to the extent mentioned in the third column thereof.

6. This Act shall not come into operation unless and until the Governor notifies by Proclamation that it is His Majesty's pleasure not to disallow the same.

SCHEDULE.
REPEALS.

Regnal Year and Chapter.	Short Title.	Extent of Repeal.
55 Vic. c. 1... ..	"The Telegraph Act, 1891" ...	Section 9; the words, "the payment of operators and assistants." Section 7.
55 Vic. c. 4... ..	"The Telegraph Amendment Act, 1892."	
58 Vic. c. 32	"The Retrenchment Act, 1895"	Section 1, the words and figures, "Superintendent of Telegraphs, £250."
2 Ed. VII. c. 12 ...	"The Telegraph Clerk's Salary Act, 1902."	The whole Act.

(3) GREATER ANTILLES.

JAMAICA

THIS "Land of Wood and Water" is the largest of the British West Indian Islands, covering an area of 4,450 square miles, and situated about 90 miles South of Cuba, between latitude 17° 43' and 18° 32' N.; its longitude stretching from 76° 11' to 78° 21' W. It was discovered on May 3rd, 1494, by Columbus, and named after St. James. The Governor is assisted by a Privy Council and a Legislative Council, the latter consisting partly of nominated and partly of elected members.

The Laws and Regulations under which radiotelegraphy is administered comprise the following :—

- A—Telegraph Control Law, 1904.
- B—Direct West India Cable Company's Law, 1909.
- C—Regulations under Law of 1904.
- D—Further Rules and Regulations.

THE TELEGRAPH CONTROL LAW (7) OF 1904.

A 1. No person shall, within the Colony or any of its Dependencies, establish, maintain or use any telegraphic apparatus, mechanism, or contrivance, of what nature or kind soever the same may be, without due permission or licence under the hand of the Governor previously obtained for that purpose.

It is hereby expressly declared that what is commonly known as "wireless telegraphy," including the Marconi apparatus and any similar or other mechanism or contrivance whatsoever for the transmission of telegraphic messages without the employment of wires or cables, is a telegraphic apparatus, mechanism, or contrivance within the meaning of this Section.

2. It shall be lawful for the Governor in Privy Council from time to time to make and as he shall see fit repeal, alter or vary rules and regulations for all or any of the following purposes, viz. :—

Permitting or licensing any person to establish, maintain, or use any telegraphic apparatus, mechanism, or contrivance, whether for the service of the public or for any private purpose ;

Attaching conditions, restrictions, and limitations to the exercise of the privilege by such permission or licence conferred :

Providing suitable penalties and forfeitures for the contravention of the prohibition above contained in Section 1 of this law, and to the breach of any rule or regulation made thereunder, and providing for the recovery thereof, summarily or otherwise ; provided that the penalty (over and above forfeitures) to be imposed for any one offence shall in no case exceed a fine of Two Hundred Pounds, or in default of payment thereof imprisonment, with or without hard labour, for a period not exceeding twelve months ;

The exercise of all such powers and control over telegraphic establishments (by temporarily entering into possession thereof or otherwise) as may be necessary for the public safety, whether at all times, or in any case of emergency which may arise ;

And generally for the better carrying out of the purposes of this law.

Such rules and regulations shall come into force as from the date of publication thereof in the *Jamaica Gazette*.

3. Nothing in this law contained shall invalidate or impair any legal right already possessed by any telegraph or cable company, relative to the laying down or landing of any telegraphic cable, the removal, renewal, maintenance, and use thereof, or any other like matter.

4. Law 1 of 1903 is hereby repealed.

LAW 21 OF 1909.

THE DIRECT WEST INDIA CABLE COMPANY'S LAW, 1909.

B Whereas the Direct West India Cable Company, Limited, is desirous of establishing a wireless installation for communication between ships and the shore in Jamaica ;

And whereas under the provisions of Law 7 of 1904, entitled "The Telegraph Control Law, 1904," no person shall establish, maintain, or use within the Island of Jamaica, or any of its Dependencies, any apparatus or machine whereby communication by wireless telegraphy can be held between the said Island and ships, without having first obtained the sanction of and a licence from the Governor;

And whereas a licence to erect such a wireless station has been granted to the Direct West India Cable Company, Limited, by the Governor of Jamaica;

Be it enacted by the Governor and Legislative Council in Jamaica a follows:—

1. The protection, rights, powers, and facilities already granted to the Direct West India Cable Company, Limited, under Law 16 of 1898, entitled "The Direct West India Cable Company's Law, 1898," are granted and extended for the purposes of wireless telegraphy installation to be installed by the company or worked and maintained by them in so far as they may be applicable to the satisfactory and efficient working and maintenance of a wireless station or stations.

2. The Government of Jamaica shall acquire for the use and at the expense of the company a piece of land of sufficient dimensions at a place to be selected by the company and approved by the Government suitable and convenient for the economical erection, maintenance, and working of the installation, and when acquired such piece of land shall be conveyed to the company in fee simple, or if the Government of Jamaica possesses a piece of land of sufficient dimensions at a place approved by the company suitable and convenient for the economical erection, maintenance, and working of the installation and which the Government considers it desirable the company should have, the Government may sell the said piece of land at a price to be mutually agreed upon, or the Government may rent it to the company on such terms as may be agreed on during the period of the licence or for so long as the company may continue to work a wireless station or stations.

The acquisition of land by the Government of Jamaica under this section shall be deemed as an acquisition for public work within the meaning of the Public Lands Acquisition Law, 1897 (Law 31 of 1897).

REGULATIONS.

It will be noted that under Clause 2 of the Telegraph Control Law (7), 1904, the Governor in Privy Council has the power of making rules and regulations, and a set of rules were accordingly promulgated during the year 1909, under which the working of wireless telegraphy is now being administered in Jamaica. These rules read as follows:—

C 1. Any licence granted under Law 7 of 1904 shall only entitle the licensee to establish, maintain and use that particular class of telegraphic apparatus, mechanism or contrivance mentioned in the licence. Every licence granted under the said law shall make mention of and fully describe the particular class of telegraphic apparatus, mechanism or contrivance which the applicant proposes to establish, maintain and use.

2. Every person establishing, maintaining or using any telegraphic apparatus, mechanism or contrivance in contravention of Section 1 of the Telegraph Control Law, 1904 (Law 7 of 1904), shall be liable to

penalty not exceeding two hundred pounds, or, in default of payment, to be imprisoned with or without hard labour for a period not exceeding twelve months, and the telegraphic apparatus, mechanism or contrivance so established, maintained or used shall be liable to be forfeited to the Government of Jamaica.

3. Every person licensed under this law, who uses any telegraphic apparatus, mechanism or contrivance for which he has not a licence, shall be liable to the penalty and forfeiture mentioned in Rule 2 hereof, if the Resident Magistrate thinks fit to order such forfeiture.

4. Every person licensed under this law who acts contrary to the terms of this licence shall be liable to the penalty and forfeiture mentioned in Rule 2 hereof, if the Resident Magistrate thinks fit to order such forfeiture.

5. Proceedings for penalty and forfeiture under these rules shall not be taken except upon the authority of the Attorney General.

6. Proceedings for the recovery of any penalty and for any forfeiture under these rules shall be of a summary nature and shall be taken before the Resident Magistrate for Kingston.

FURTHER RULES.

Further Rules and Regulations made by the Acting Governor
D *in Privy Council under the Telegraph Control Law, 1904, Law 7 of 1904.*

1. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of this colony shall be worked in such a way as not to interfere with (a) naval signalling, or (b) the working of any wireless telegraph station lawfully established, installed or worked in the colony or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used whilst such ship is in any of the harbours of the colony except with the special or general permission in writing of the Governor.

3. These rules and regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

4. If at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy the use of the wireless telegraphy on board merchant ships whilst in the territorial waters shall be subject to such further rules and regulations as may be made by the Governor from time to time, and such rules and regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

5. The master of any merchant ship on board of which apparatus for wireless telegraphy shall be worked or used contrary to these rules and regulations shall on summary conviction before a Resident Magistrate be liable to a penalty not exceeding two hundred pounds, and in default of payment to be imprisoned with or without hard labour for a period not exceeding twelve months.

(4) LESSER ANTILLES.

(a) BARBADOS.

BARBADOS (Latitude $13^{\circ} 4' N.$ and Longitude $59^{\circ} 37' W.$) is the most easterly of the West Indian Islands. Its superficial area is reckoned at 166 square miles, or rather more than that of the Isle of Wight. It fell first under British rule in 1605 and has so remained ever since, recording the fact in its most favoured epithet "ever British."

Wireless telegraphy in this colony owes much to a wireless club formed amongst a number of young Barbadians. Starting with some home-made apparatus, whose aerals were supported on bamboo poles, the local radiotelegraphic station, after the commencement of hostilities, developed rapidly, assisted by a private subscription list which was headed by the Governor and Members of the Legislative Council.

Practical demonstration of its utility became so unmistakable that it has now assumed the form of a regular two-kilowatt installation, maintained for defence purposes, but affording every facility (compatible with military considerations) to merchants and shipping agents free of charge.

This constitutes the only land station in Barbados. It is worked under Government control, and the Officer-in-Charge is: Lieutenant-Engineer E. F. S. Bowen, Superintendent of Public Works.

Wireless telegraphy in Barbados is worked under three sets of regulations: (a) The Barbados Wireless Act of 1905; (b) an Amending Act, passed in April, 1913; and (c) a number of rules made under the latter Act.

As these are quite distinct, we publish their respective texts, as follows, below:—

A—Wireless Act, 1905 (confirmed 1908).

B—Wireless Act, 1913.

C—Executive Rules.

D—Wireless and Submarine Telegraphy (Amendment) Act, 1917.

E—Further Regulations dated June 19th, 1917.

WIRELESS ACT, 1905 (CONFIRMED 1908).

A 1. This Act may be cited as the Wireless and Submarine Telegraph Act, 1905.

2. (1) The West India and Panama Telegraph Company shall not lay down or maintain a new telegraph cable nor shall any other company or person lay down or maintain any telegraph cable upon the foreshore and bed of the sea except under and in accordance with an Act of the Legislature.

(2) A person shall not establish any wireless telegraph station, or instal or work any apparatus for wireless telegraphy in any place in this island except under and in accordance with an Act of the Legislature.

(3) If the West India and Panama Telegraph Company lays down or maintains a new telegraph cable or if any other company or person lays down or maintains any telegraph cable upon the fore

shore or bed of the sea without the authority of an Act of the Legislature in that behalf, the company or person shall be liable, on conviction before a Police Magistrate, to a penalty not exceeding £100 and shall forthwith remove the telegraph cable, and if the telegraph cable be not removed within one day after such conviction the company or person shall be liable to a penalty not exceeding £50 for each day thereafter during which the company or person shall fail to remove the telegraph cable. Provided, that the Governor-in-Executive Committee may at any time after the expiration of one day from the date of the conviction cause the same to be removed and destroyed.

(4) If any person establishes a wireless telegraph station without the authority of an Act of the Legislature in that behalf, or installs or works any apparatus on any place in this island for wireless telegraphy without such authority in that behalf, he shall be liable, on conviction before a Police Magistrate, to a penalty not exceeding £100, and further be liable to forfeit any apparatus for wireless telegraphy installed or worked without such authority.

(5) If a Police Magistrate is satisfied by information on oath that there is reasonable ground for supposing that a wireless telegraph station has been established without legal authority in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place within his jurisdiction without such authority in that behalf, he may grant a search warrant to any police officer named in the warrant, and a warrant so granted shall authorise the officer named therein to enter and inspect the station or place and to seize any apparatus which appears to him to have been used, or intended to be used, for wireless telegraphy therein.

(6) No proceedings shall be taken under any of the provisions of this section except by order of the Governor.

3. This Act shall continue in force until the 31st day of March, 1907. (*By an amending Act of 1908 this Act continues in force until repealed by the Legislature.*)

WIRELESS ACT, 1913.

Passed on the 11th April, 1913.

B 1. This Act may be cited as the Wireless and Submarine Telegraph (Amendment) Act, 1913.

2. (1) *Making of Rules and Regulations.*—The Governor-in-Executive Committee may from time to time make rules and regulations governing the use of wireless telegraph apparatus on merchant ships, British or foreign, while in the territorial waters of this Colony.

(2) *Ratification.*—Such rules and regulations, when sanctioned by both Houses of the Legislature and assented to by the Governor, shall come immediately into operation and shall have the same force and effect as if the same had been herein expressly enacted.

(3) *Penalties.*—If the master of such ship or any person on board such ship commits a breach of any of these rules and regulations:

(a) the ship shall be subject to a maritime lien in favour of His Majesty the King, his heirs and successors, for a sum of one hundred pounds, and the amount so charged may be sued for and recovered in the Colonial Court of Admiralty;

- (b) the ship may be detained by force if necessary by the Harbour and Shipping Master or his chief clerk, with the aid of the harbour police, until payment of the lien aforesaid or until arrested under process of the Colonial Court of Admiralty;
- (c) the master of such ship shall be liable to a penalty not exceeding fifty pounds;
- (d) the person committing the breach shall be liable to a penalty not exceeding fifty pounds.

3. (1) *Special Orders*.—In any case of urgency which is not provided for in the rules and regulations, the Governor may make any special order, and such order shall come immediately into operation and shall have the same force and effect as if the same had been herein expressly enacted.

(2) *Penalties*.—If the master of such ship or any person on board such ship commits a breach of any special order, the ship shall be subject to the maritime lien imposed by section 2 of this Act for the amount therein mentioned, and may be detained as is therein provided, and the master, and the person committing the breach, shall be liable to a penalty not exceeding fifty pounds.

EXECUTIVE RULES ISSUED BY THE GOVERNOR.

1. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the Colony shall be worked in such a way as not to interfere with (a) Naval signalling or (b) the working of any wireless telegraph station lawfully established, installed, or worked in the Colony or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used whilst such ship is in any of the harbours of the Colony except with the special or general permission of the Colonial Secretary of the Colony.

3. If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the territorial waters shall be subject to such further rules as may be made by the Governor from time to time, and such rules may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

4. These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

[3rd May, 1917.]

AN ACT

D To amend the Wireless and Submarine Telegraph Amendment Act, 1913 (1913-16).

Be it enacted by the Governor, Council, and Assembly of this island, and by the authority of the same, as follows :

1. This Act may be cited as the Wireless and Submarine Telegraph (Amendment) Act, 1917.

2. The Wireless and Submarine Telegraph (Amendment) Act, 1913, is hereby amended by inserting the words "and yachts" immediately after the words "merchant ships" in line three of subsection 1 of section 2 thereof, and the word "ship" wherever occurring in the subsequent parts of the Act shall be construed as including a yacht.

3. The Regulations made under the authority of the said Act by the Governor-in-Executive Committee on the thirty-first day of July nineteen hundred and thirteen shall apply to yachts as fully and in the same manner in all respects as they do to merchant ships.

Read three times and passed the General Assembly on the seventeenth day of April, one thousand nine hundred and seventeen.

By Command,
T. E. FELL, Colonial Secretary.

REGULATIONS

E Made by the Governor-in-Executive Committee under the Public Safety Act, 1914 (1914-24) :

1. The radio-telegraph stations on board ships (other than His Majesty's ships of war or the ships of war of His Majesty's Allies) shall not be worked whilst such ships are within any bay or harbour of this island.

2. Ships of British register in any such bay or harbour shall completely disconnect their aerial wires from their radio apparatus, the ends of such wires being suspended entirely clear of the radio-telegraph cabin, preferably from the main rigging, in such a manner as to show they are properly disconnected.

3. Ships of foreign register in any such bay or harbour shall, subject to the provisions of the next regulation, take down their aerial wires completely and disconnect the same from their radio-telegraph apparatus.

4. Ships of foreign register remaining in any such bay or harbour for less than twelve hours may, at the discretion of the Governor, be permitted to leave their aerials up, provided the same are disconnected in accordance with the provisions of regulation 2 above.

5. The Governor shall have power to order that the operating room of any ship (other than a ship of war) be sealed and to take any measures he may deem necessary for securing the effective execution of the foregoing regulations, and for preventing on every such ship the use of radio-telegraphy in any form or by any means.

6. The regulations made by the Governor-in-Executive Committee under the Public Safety Act, 1914, on the nineteenth day of March nineteen hundred and seventeen are hereby revoked.

Made by the Governor-in-Executive Committee this eighteenth day of June, 1917.

(b) LEEWARD ISLANDS.

THE Leeward Islands consist of the five Presidencies of : (1) Antigua with Barbuda and Redonda ; (2) St. Christopher and Nevis with Anguilla ; (3) Dominica ; (4) Mont-Serrat ; and (5) The Virgin Islands with Sombbrero. All, save the latter, are administered by a Governor, assisted by their own local legislature ; (5) being presided over by Commissioners. The Administrative Centre and the Residence of the Governor-in-Chief is St. Johns, Antigua, lying in $17^{\circ} 6' \text{ N. latitude}$, $61^{\circ} 45' \text{ W. longitude}$.

Wireless telegraphy is administered under :

A—Ordinance No. 11, 1913.

B—Regulations made thereunder in 1913, and

C—Further regulations dated 28th August, 1917.

Similar legislation is in force in the other islands under the same administration.

ANTIGUA, No. 11 OF 1913.

A An Ordinance to consolidate and amend the law relating to wireless telegraphy.

Be it ordained by the Governor and Legislative Council of Antigua as follows :

1. This Ordinance may be cited for all purposes as “ The Wireless Telegraphy Consolidation Ordinance, 1913.”

2. In this Ordinance “ Wireless Telegraphy ” means any system of communication by telegraph without the aid of any wire connecting the points from and at which the messages or other communications are sent or received : Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. (1) No person shall establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place or on board any ship registered in the Colony except under and in accordance with a licence granted in that behalf by the Governor-in-Council.

(2) Every such licence shall be in such form and for such period as the Governor-in-Council may determine, and shall contain the terms conditions and restrictions on and subject to which it is granted.

4. No person shall work any apparatus for wireless telegraphy installed on any merchant ship, whether British or Foreign, while that ship is in the territorial waters of the Presidency, otherwise than in accordance with regulations under this Ordinance.

5. (1) The Governor-in-Council may from time to time make regulations for carrying into effect the purposes of this Ordinance, and such regulations shall on publication in the *Gazette* have the same effect as if enacted in this Ordinance.

(2) The regulations in the Schedule to this Ordinance shall have effect except in so far as they may be amended or rescinded by regulations made under the authority of this section.

(3) If at any time in the opinion of the Governor-in-Council an emergency has arisen in which it is expedient for the public service that

His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in territorial waters of the Presidency shall be subject to such further regulations as may be made by the Governor-in-Council from time to time, and such regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

6. If a Magistrate is satisfied by information on oath that there is reasonable ground for suspecting that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship without a licence in that behalf or contrary to the provisions of any regulations made under this Ordinance or of any licence granted under this Ordinance, he may grant a search warrant to any Police Officer or any person appointed in that behalf by the Chief Inspector of Police and named in the warrant and a warrant so granted shall authorise the Police Officer or person named therein to enter and inspect the station, place or ship and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

7. (1) Any person guilty of an offence against any provisions of this Ordinance or any of the regulations made thereunder shall be liable on summary conviction for every such offence to a fine not exceeding fifty pounds, and upon such conviction the Court may order that any apparatus for wireless telegraphy in connection with which the offence was committed shall be seized and forfeited.

(2) Proceedings under this Ordinance shall be taken on the complaint of the Chief Inspector of Police or of any person thereto authorised by him in writing.

8. Ordinance No. 12 of 1903 entitled "An Ordinance to regulate the establishment of Wireless Telegraphy" and Ordinance No. 7 of 1913 entitled "An Ordinance to amend the Wireless Telegraphy Ordinance, 1903," are hereby repealed.

Passed the Legislative Council the 14th day of October, 1913.

Dated at Antigua the 23rd day of October, 1913, in the fourth year of His Majesty's reign.

SCHEDULE—SECTION 5 (2).

REGULATIONS.

B 1. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the Presidency shall be worked in such a way as not to interfere with

(a) Naval signalling, or

(b) the working of any wireless telegraph station lawfully established, installed or worked in the Presidency or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. In these Regulations " Naval Signalling " means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and Naval stations, or between a ship of His Majesty's Navy or a Naval Station and any other wireless telegraph station whether on shore or on any ship.

3. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used while such ship is in any harbour or bay of the Presidency except with the special or general permission of the Governor-in-Council.

4. For the purpose of any proceedings under these Regulations the master or person being or appearing to be in command or charge of any ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.

5. Any summons or other document in any proceedings under these Regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in command or charge of the ship.

6. These Regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

REGULATIONS.

MADE BY THE GOVERNOR-IN-COUNCIL.

C Whereas it is provided by section 5 (3) of the Wireless Telegraphy Consolidation Ordinance, 1913, that if at any time, in the opinion of the Governor-in-Council, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy the use of wireless telegraphy on board merchant ships while in the territorial waters of the Presidency shall be subject to such further regulations as may be made by the Governor-in-Council from time to time ; and such regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

And whereas in my opinion such emergency as aforesaid has arisen ;

Now I do hereby rescind the further Regulations made under the said Ordinance on the 8th day of September, 1914, and make the following Regulations, namely :—

1. The radiotelegraph stations on board ships (other than ships requisitioned by His Majesty's Government) shall not be worked whilst such ships are within a harbour of the Presidency and for the proper enforcement of the above.

(a) Ships of British register in harbours of the Presidency must completely disconnect their aerial wires from their radio apparatus, the ends of such wires being suspended entirely clear of the radiotelegraph cabin, preferably from the main rigging, in such a manner as to show that they are properly disconnected.

(b) Ships of foreign register in a harbour of the Presidency must, subject to the provisions of the following sub-sections (c) take down their aerial wires completely and disconnect the same from their radiotelegraph apparatus.

(c) Ships of foreign register remaining in the harbour of the Presidency for less than twelve hours may at the discretion of the Governor be permitted to leave their aerials up, provided the same are disconnected in accordance with the provisions of sub-section (a) of this Regulation.

2. The Governor may at his discretion direct that the operating room of any ship (other than a ship requisitioned by His Majesty's Government) in a harbour of the Presidency be sealed or order any other steps to be taken affecting the radiotelegraph station on board any such ship.

3. Every person failing to obey and to conform with the provisions of these Regulations or with any directions given by the Governor under the same shall be guilty of an offence and shall be liable on summary conviction to the penalties under the Ordinance provided.

Made by the Governor-in-Council, under section 5 (3) of the Wireless Telegraphy Consolidation Ordinance, 1913, this 28th day of August, 1917.

(c) WINDWARD ISLANDS.

THESE consist of Grenada, St. Lucia and St. Vincent, as well as the small islands of the Grenadines, half of which are administered under St. Vincent, and half under Grenada and St. Lucia. The Governor and Commander-in-Chief resides at St. Georges, Grenada. Each island has its own institutions, and the ruling wireless regulations (where existent) are appended below under the heading of each island.

GRENADA.

GRENADA, and the chain of small islands called the Grenadines, lie between $12^{\circ} 30'$ and $11^{\circ} 58' N.$ latitude, whilst their longitude is included between $61^{\circ} 20'$ and $61^{\circ} 35' W.$ The total area of the Colony is estimated at about 85,120 acres. Originally settled by the French, it was definitely ceded to Great Britain in 1783. Wireless telegraphy is regulated by the Wireless Telegraph Ordinance 1903, the text of which we append. There are no wireless clubs or societies in the Colony.

In this Ordinance the term "Wireless Telegraphy" means any system or installation designed or constructed for the transmission or receipt of any messages or communications to or from a distant place by means of electric currents and signals generated by any apparatus or instrument which system, installation or instrument is unconnected by wire or other tangible attachment with such distant place. The term "Wireless Telegram" means any message or communication transmitted, or intended for transmission, by wireless telegraphy.

2. The Governor in Council and the servants of the Government of the Colony shall have the exclusive privilege of installing, erecting, maintaining, and using in this Colony apparatus intended for wireless telegraphy, and also the incidental services of transmitting, receiving, collecting or delivering wireless telegrams.

3. It shall not be lawful for any person to instal, erect, maintain or use in this Colony any apparatus or instrument for the purpose of

wireless telegraphy without having previously obtained from the Governor a licence in that behalf to be granted on such terms and conditions as the Governor may prescribe.

4. Any person contravening the provisions of this Ordinance shall be liable on conviction to a fine not exceeding Fifty Pounds, and the apparatus and installation in respect of which a conviction is obtained may by order of the Magistrate before whom such conviction is obtained be forfeited to the use of His Majesty the King.

5. All proceedings under this Ordinance may be taken before the Magistrate of the Southern District or any other person appointed by the Governor for the purpose of hearing and deciding the case; and the mode of procedure shall be according to the law in force for the time being in respect of other offences punishable on summary conviction.

6. This Ordinance may be cited as "The Wireless Telegraph Ordinance."

ST. LUCIA.

ST. LUCIA, lying 30 miles north-east of St. Vincent, possesses a total area of 233 square miles. One of the most notable features consists of a twin natural phenomenon known as the Pitons, great conical mountains, which lie at the mouth of Soufrière Bay. Castries, the capital, is situated on the western coast, near its northern extremity.

Wireless telegraphy is administered under an Ordinance of 1912 and various Regulations issued on its authority.

A—Wireless Telegraphy Ordinance, 1912.

B—Regulations of November 25th, 1912.

C—Regulations of August 24th, 1914.

D—Regulations affecting Ship Stations, June 9th, 1917.

WIRELESS TELEGRAPHY ORDINANCE.

No. 10 of 1912.

A This Ordinance may be cited as the Wireless Telegraphy Ordinance, 1912.

2. In this Ordinance "wireless telegraphy" means any system of communication by telegraph without the aid of any wire connecting the points from and at which the messages or other communications are sent or received: Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. (a) A person shall not establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place or on board any ship registered in the Colony except under and in accordance with a licence granted in that behalf by the Governor.

(b) Every such licence shall be in such form and for such period

as the Governor may determine, and shall contain the terms, conditions and restrictions on and subject to which it is granted.

4. A person shall not work any apparatus for wireless telegraphy installed on any merchant ship, whether British or foreign, while that ship is in the territorial waters of the Colony, otherwise than in accordance with regulations under this Ordinance.

5. (a) The Governor may from time to time make regulations for carrying into effect the purposes of this Ordinance, and such regulations shall on publication in the *Gazette* have the same effect as if enacted in this Ordinance.

(b) The regulations in the Schedule to this Ordinance shall have effect except in so far as they may be amended or rescinded by regulations made under the authority of this section.

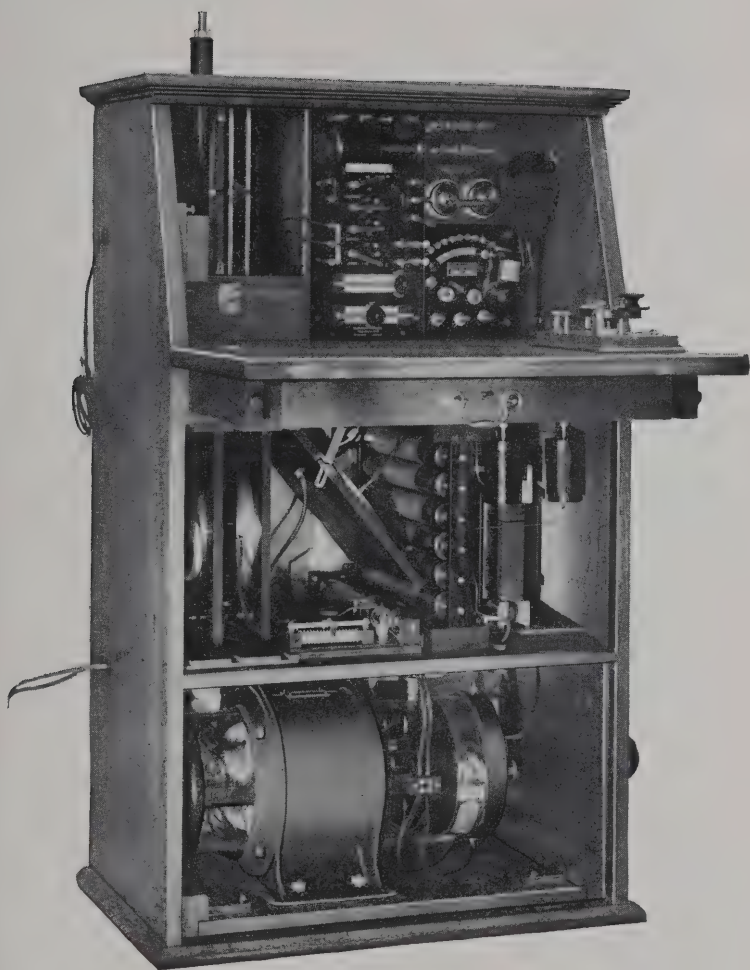
(c) If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the territorial waters of the Colony shall be subject to such further regulations as may be made by the Governor from time to time, and such regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

6. If a Magistrate is satisfied by information on oath that there is reasonable ground for suspecting that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship without a licence in that behalf or contrary to the provisions of any regulations made under this Ordinance or of any licence granted under this Ordinance, he may grant a search warrant to any police officer or any person appointed in that behalf by the Chief of Police and named in the warrant, and a warrant so granted shall authorise the police officer or person named therein to enter and inspect the station, place or ship and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

7. (a) Any person who shall offend against any provision of this Ordinance or any of the regulations made thereunder shall be liable on summary conviction for every such offence to a fine not exceeding fifty pounds, and upon such conviction the Court may order that any apparatus for wireless telegraphy in connection with which the offence was committed shall be seized and forfeited.

(b) Proceedings shall be taken before the First District Court on the complaint of the Chief of Police or of any person thereto authorised by him in writing, and the procedure shall be the same as the procedure for the time being in force in respect of offences punishable on summary conviction.

8. The Wireless Telegraph Ordinance, 1903, is hereby repealed.



A $\frac{1}{4}$ -KILOWATT SET (INTERIOR VIEW).

[To face page 548.]

SCHEDULE—SECTION 5 (2).

REGULATIONS PASSED NOVEMBER 25TH, 1912.

B All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the Colony shall be worked in such a way as not to interfere with—

(a) Naval signalling, or

(b) the working of any wireless telegraph station lawfully established, installed or worked in the Colony or the territorial waters thereof; and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. In these Regulations “naval signalling” means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty’s Navy, between ships of His Majesty’s Navy and naval stations, or between a ship of His Majesty’s Navy or a naval station and any other wireless telegraph station whether on shore or on any ship.

3. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used while such ship is in any harbour or bay of the Colony except with the special or general permission of the Governor.

4. For the purpose of any proceedings under these regulations the master or person being or appearing to be in command or charge of any ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.

5. Any summons or other document in any proceedings under these regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in charge or command of the ship.

6. These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

REGULATIONS PASSED AUGUST 24TH, 1914.

C Whereas by Section 5 (3) of the Wireless Telegraphy Ordinance, 1912, it is enacted that if at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty’s Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the territorial waters of the Colony shall be subject to such further regulations as may be made by the Governor from time to time; and such regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

And whereas, in my opinion, such emergency as aforesaid has arisen :—

Now I (the Acting Administrator) do hereby make the following further Regulations, namely :—

1. The Governor may appoint any person to take possession and control of the apparatus for wireless telegraphy on board of any merchant ship while in the territorial waters of the Colony.

2. Any person so appointed may enter upon any such ship and take possession of the aforesaid apparatus thereon on behalf of His Majesty, and use the same for His Majesty's Service, and subject thereto for such ordinary services as to the said person may seem fit.

3. Any such person may instead of taking possession of such apparatus as aforesaid direct the master of the ship to submit or cause to be submitted to him all messages intended for transmission or arriving by the said apparatus or any class or classes of such messages, to stop or delay the transmission of any messages or deliver the same to him, and generally to obey all such directions with reference to the transmission of messages as such person may prescribe, and the master of the ship shall obey and conform to all such directions. Any master failing to obey and conform to any such direction shall be liable on summary conviction to the penalties provided under the Ordinance.

REGULATIONS MADE BY THE GOVERNOR.

OPERATION OF SHIP STATIONS WITHIN THE TERRITORIAL WATERS OF THE COLONY.

June 9th, 1917.

D 1. The radiotelegraph stations on board ships (other than His Majesty's ships of war or ships of war of his Allies) shall not be worked whilst such ships are within the territorial waters of the Colony.

2. For the proper enforcement of the above, ships of British register in the territorial waters of the Colony must completely disconnect their aerial wires from their radio apparatus, the ends of such wires being suspended entirely clear of the radiotelegraph cabin, preferably from the main rigging in such a manner as to show they are properly disconnected.

3. Ships of foreign register in the territorial waters of the Colony must—subject to the provisions of the following Regulation 4—take down their aerial wires completely and disconnect the same from their radiotelegraph apparatus.

4. Ships of foreign register remaining in the territorial waters of the Colony for less than twelve hours may, at the discretion of the competent naval authority, or the person appointed by the Governor for the purpose, be permitted to leave their aerials up, provided the same

are disconnected in accordance with the provisions of Regulation 2 of these regulations.

ST. VINCENT.

ST. VINCENT, lying 30 miles south-west of St. Lucia and 97 miles west of Barbados, comprises an area of 140 square miles.

Wireless telegraphy is administered under an Ordinance and Regulations which figure below.

A—Wireless Telegraphy Ordinance, 1913.

B—Regulations.

ORDINANCE.

A This Ordinance may be cited as "The Wireless Telegraphy Ordinance, 1913."

2. In this Ordinance "Wireless Telegraphy" means any system of communication by telegraph without the aid of any wire connecting the points from and at which the messages or other communications are sent or received: Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. (1) A person shall not establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place or on board any ship registered in the Colony except under and in accordance with a licence granted in that behalf by the Governor.

(2) Every such licence shall be in such form and for such period as the Governor may determine, and shall contain the terms, conditions, and restrictions on and subject to which it is granted.

4. A person shall not work any apparatus for wireless telegraphy installed on any merchant ship, whether British or foreign, while that ship is in the territorial waters of the Colony otherwise than in accordance with regulations under this Ordinance.

5. (1) The Governor in Council may from time to time make regulations for carrying into effect the purposes of this Ordinance, and such regulations shall on publication in the *Gazette* have the same effect as if enacted in this Ordinance.

(2) The Regulations in the Schedule to this Ordinance shall have effect except in so far as they may be amended or rescinded by regulations made under the authority of this section.

(3) If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the territorial waters of the Colony shall be subject to such further regulations as may be made by the Governor from time to time, and such regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

6. If a Magistrate is satisfied by information on oath that there is reasonable ground for suspecting that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship without a licence in that behalf or contrary to the provisions of any regulations made under this Ordinance, or of any licence granted under this Ordinance, he may grant a search warrant to any Police Officer or any person appointed in that behalf by the Chief of Police and named in the warrant, and a warrant so granted shall authorise the Police Officer or person named therein to enter and inspect the station, place, or ship, and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

7. (1) Any person who shall offend against any provision of this Ordinance or any of the regulations made thereunder shall be liable on summary conviction for every such offence to a fine not exceeding fifty pounds, and upon such conviction the court may order that any apparatus for wireless telegraphy in connection with which the offence was committed shall be seized and forfeited.

(2) Proceedings shall be taken before the Police Magistrate of the First District on the complaint of the Chief of Police or of any person thereto authorised by him in writing, and the procedure shall be the same as the procedure for the time being in force in respect of offences punishable on summary conviction.

8. "The Wireless Telegraph Ordinance, 1904," and "The Wireless Telegraph Amendment Ordinance, 1912," are hereby repealed.

REGULATIONS.

B 1. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the Colony shall be worked in such a way as not to interfere with—

(a) Naval signalling, or

(b) the working of any wireless telegraph station lawfully established, installed, or worked in the Colony or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. In these Regulations "Naval Signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and Naval Stations, or between a ship of His Majesty's Navy or a Naval Station and any other wireless telegraph station whether on shore or on any ship.

3. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used while such ship is in any harbour or bay of the Colony except with the special or general permission of the Governor.

4. For the purpose of any proceedings under these regulations the master or person being or appearing to be in command or charge of any ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.

5. Any summons or other document in any proceedings under these Regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in command or charge of the ship.

6. These Regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

7. Regulations made by the Governor in Council on the 17th day of December, 1912, under the authority of the Wireless Telegraph Ordinances, 1904 and 1912, are hereby repealed.

(d) TRINIDAD AND TOBAGO.

THE Colony of Trinidad and Tobago includes the island of Trinidad, which is about 55 miles long by 40 miles wide, with an area of 1,974 square miles, and the island of Tobago, which is about 26 miles long and $7\frac{1}{2}$ miles wide, with an area of 114 square miles.

Trinidad is situated about 10° north of the Equator, between 61° and 62° west longitude, and Tobago is to the north-east of Trinidad, about $11^{\circ} 9'$ north latitude and $60^{\circ} 12'$ west longitude.

They form a Crown Colony, and their government is administered by a Governor, assisted by an Executive Council and Legislative Council.

The ordinance relating to wireless telegraphy is No. 6 of 1917, a copy of which is attached.

The first wireless station in Trinidad was erected in 1905 at the north-western corner of the island to obtain a direct sea line with Tobago, and merely to bring Tobago into telegraphic communication with Trinidad and thus with the outer world. It was a 2-kw. Lodge-Muirhead station. Subsequently this station was removed, and a 5-kw. Marconi station was erected in Port of Spain, with a daylight range of about 350 nautical miles and 1,000 nautical miles at night. Public ship and shore service is maintained therewith.

The Tobago station is on the Fort King George, east of Scarborough, the capital of Tobago, and is a 3-kw. station (Marconi and Lodge-Muirhead) with a daylight range of about 350 nautical miles, and about 600 nautical miles at night.

Both stations are controlled by the Government under the direct supervision of the Public Works Department.

Officials.—Head of Wireless Service, Trinidad and Tobago: The Director of Public Works. Head Operator: M. N. Headley (acting). Principal Assistants: L. W. Pouchet, V. N. Arneaud, and A. E. Wilson.

The Laws and Regulations governing radiotelegraphy in these colonies which we reprint here are in accordance with the following list of which the Ordinance issued May 8th, 1917, is that now in force :—

A—Wireless Telegraphy Ordinance, 1909.

B—Ordinance No. 236.

C—Regulations.

D—Ordinance issued May 8th, 1917.

ORDINANCE OF 1909.

A Be it enacted by the Governor of Trinidad and Tobago with the advice and consent of the Legislative Council thereof as follows :—

1. This Ordinance may be cited as the Wireless Telegraphy Ordinance, 1909.

2. No person shall work any apparatus for wireless telegraphy installed on any merchant ship whilst that ship is in the territorial waters of the Colony, otherwise than in accordance with regulations from time to time made in that behalf by the Governor.

Such regulations may impose penalties recoverable summarily for the breach of any such regulations, not exceeding ten pounds for each offence.

All such regulations shall be published in the *Royal Gazette*, and production of such *Gazette* containing a copy of such regulations shall in all legal proceedings be sufficient evidence of the due making and tenor thereof.

Passed in Council this twentieth day of December, in the year of Our Lord one thousand nine hundred and nine.

ORDINANCE NO. 236.

DATED FEBRUARY 3RD, 1910.

RELATING TO WIRELESS TELEGRAPHY.

B 1. *Short Title*.—This Ordinance may be cited as the Wireless Telegraphy Ordinance.

2. *Licence*.—It shall not be lawful for any person or corporation to use or establish in this Colony any apparatus or installation for the purposes of wireless telegraphy, without first obtaining from the Governor a licence in that behalf, to be granted on such terms and conditions as the Governor may from time to time prescribe.

3. *Penalty*.—Any person or corporation contravening the provisions of the last preceding section shall be guilty of an offence, and on summary conviction thereof shall be liable to a fine of £50, and the apparatus and installation in respect of which a conviction is obtained may by order of the stipendiary justice before whom such conviction is obtained be forfeited to the use of His Majesty the King.

REGULATIONS.

C 1. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the Colony shall be worked in such a way as not to interfere with (a) Naval signalling or (b) the working of any wireless telegraph station lawfully established,

installed, or worked in the Colony or the territorial waters thereof, and in particular the said apparatus shall be worked so as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used whilst such ship is in any of the harbours of the Colony, except with the special or general permission in writing of the Director of Public Works of the Colony. Such special or general permission shall only be given to any ship subject to the condition that it shall not exchange signals with another ship except on the private business of the owners.

3. If at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that His Majesty's Government shall have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships whilst in the territorial waters shall be subject to such further rules as may be made by the Governor from time to time, and such rules may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

4. These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

5. Any person committing a breach of these regulations shall be guilty of an offence, and on conviction shall be liable to a penalty not exceeding ten pounds.

Made by the Governor under the Wireless Telegraphy Ordinance, 1909 (35-1909) this third day of February 1910.

ORDINANCE No. 6 OF 1917.

ISSUED MAY 8TH, 1917.

D Be it enacted by the Governor of Trinidad and Tobago with the advice and consent of the Legislative Council thereof as follows :—

1. This Ordinance may be cited as the Wireless Telegraphy Ordinance, 1917.

2. (1) It shall not be lawful for any person to use or establish in this Colony any apparatus or installation for the purposes of wireless telegraphy, without first obtaining from the Governor a licence in that behalf, to be granted on such terms and conditions as the Governor may from time to time prescribe.

(2) Any person contravening the provisions of this section is liable on summary conviction before a Magistrate to a fine not exceeding £50 or to imprisonment, with or without hard labour, for any term not exceeding six months, and the apparatus and installation in respect of which a conviction is obtained may by order of the convicting magistrate be forfeited to the use of His Majesty the King.

3. (1) No person shall work any apparatus for wireless telegraphy installed on any merchant ship whilst that ship is in the territorial waters of the Colony, otherwise than in accordance with regulations made in that behalf by the Governor in Executive Council.

(2) Such regulations shall be published in the *Royal Gazette*.

(3) Any person contravening, or permitting, procuring, or assisting in the contravention of, any such regulation is liable, on summary conviction before a magistrate, to a penalty not exceeding £50 or to imprisonment, with or without hard labour, for any term not exceeding six months.

4. Any person who unlawfully and maliciously :—

(a) Injures, removes or destroys any apparatus or installation for the purpose of wireless telegraphy, or any part of such apparatus or installation ; or

(b) Obstructs or prevents in any manner whatsoever the sending, conveyance or delivery of any message or signal by wireless telegraphy ;

is guilty of a misdemeanour and is liable to imprisonment, with or without hard labour, for any term not exceeding two years.

5. The Wireless Telegraphy Ordinance (No. 236) and the Wireless Telegraphy Ordinance 1909 are hereby repealed.

Passed in Council this twenty-seventh day of April, in the year of Our Lord one thousand nine hundred and seventeen.

(5) BRITISH GUIANA.

THIS Colony, which includes the counties of Demerara, Essequibo and Berbice, lies on the north-east coast of South America, and has a total area of 90,277 square miles. The government is administered by a Governor with a Court of Policy consisting of fifteen other members, seven official and eight elected. There are 1,603 miles of Post Office telephone wire and 530 telegraph lines, with 72 post offices.

Both the ownership and working of all radiotelegraphic stations are vested in the Government. The administration of wireless telegraphy is carried out under the following regulations :—

A—The Telegraph Ordinance, 1903.

B—Ordinance No. 7 of 1910.

A This Ordinance may be cited as “The Telegraph Ordinance, 1903.”

2. In this Ordinance “telegraph” means an electric, galvanic, or magnetic telegraph, and includes appliances and apparatus for transmitting or making telegraphic, telephonic or other communication by means of electricity, galvanism or magnetism, whether the same be transmitted by means of wires or cables or without wires or cables.

3. The Governor-in-Council shall have the exclusive privilege of establishing, maintaining and working telegraphs between the Colony and places outside of the Colony.

Provided that the Governor-in-Council may grant a licence on such conditions and in consideration of such payments as he thinks fit, to any person, company or body corporate, to establish, maintain or work a telegraph between the Colony and any place or places outside the Colony; and

Provided that nothing in this Ordinance shall apply to or in any way affect the rights already granted to the West India and Panama Telegraph Company, Limited, under any Ordinance or Ordinances passed before the commencement of this Ordinance.

ORDINANCE NO. 7 OF 1910.

B 1. (1) A person shall not establish any wireless telegraph station or install or work any apparatus for wireless telegraphy in any place or on board any British ship registered in the Colony, except under and in accordance with a licence granted in that behalf by the Governor-in-Council.

(2) A person shall not work any apparatus for wireless telegraphy installed on any merchant ship (whether British or foreign) whilst that ship is in the territorial waters of the Colony, otherwise than in accordance with regulations made in that behalf by the Governor-in-Council, and the Governor-in-Council may, by any such regulations, impose penalties recoverable summarily for the breach of any such regulations, not exceeding fifty dollars for each offence, and may provide for the forfeiture on any such breach of any apparatus for wireless telegraphy installed or worked on such ship.

(3) If any person establishes a wireless telegraph station without a licence in that behalf, or installs or works any apparatus for wireless telegraphy without a licence in that behalf, he shall be guilty of a misdemeanour and be liable on summary conviction thereof to a penalty not exceeding fifty dollars, and, on conviction on indictment, to a fine not exceeding five hundred dollars, or to imprisonment, with or without hard labour, for a term not exceeding twelve months, and in either case be liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence.

(4) If a Justice of the Peace is satisfied by information on oath that there is reasonable ground for supposing that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship within his jurisdiction without a licence in that behalf or contrary to the provisions of the regulations made under sub-section two of this section, he may grant a search warrant to any police officer or any officer appointed in that behalf by the Governor or the Postmaster-General and named in the warrant, and a warrant so granted shall authorise the officer named therein to enter and inspect the station, place or ship and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

(5) The expression "wireless telegraphy" means any system of communication by telegraph without the aid of any wire connecting the points from and at which the messages or other communications are sent and received : Provided, That nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

2. This Ordinance may be cited as the Wireless Telegraphy Ordinance, 1910.

WEST INDIES (AMERICAN)

PUERTO RICO.

THE Island of the "Greater Antilles" group in the West Indies, known under the Spanish name of Rich Harbour, lies with regard to latitude between $17^{\circ} 50'$ and $18^{\circ} 30'$ north ; its longitude ranging from $65^{\circ} 30'$ to $67^{\circ} 15'$ west, and its total area comprising 3,606 square miles. The capital, San Juan, is 1,400 miles from New York and 982 from Key West. It is administered by a Governor, with an Executive Council appointed by the President of the U.S.A. and a House of Delegates elected for two years. The regulation of wireless telegraphy rests in the hands of the U.S.A. Navy Department, Washington, and no private installations, clubs or societies exist in the island, with the exception of an installation worked by the Central Guanica (Sugar Refining) Company, connecting with the Central Romana (a similar company) in the Republic of Santo Domingo.

WEST INDIES (INDEPENDENT).

See under "HAITI" (page 320) and "SANTO DOMINGO" (page 447).

ZANZIBAR

THE whole of Zanzibar, covering an area of 640 square miles, lies in 6° south latitude, and is separated from the mainland by a channel $22\frac{1}{2}$ miles across at its narrowest part. It was not until during the sixteenth century that the Arabs of the East Coast succeeded in driving out the Portuguese, and the island was then attached (more or less nominally) to the rulers of Muscat. The supremacy of British interests in the island was recognised by other European States in 1890, Great Britain waiving all claims to Madagascar in favour of France, and ceding Heligoland to Germany.

The ruler of Zanzibar is a native Sultan ; but the administration is conducted by a British High Commissioner and Resident.

The Government maintains wireless stations in Zanzibar and Pemba, but it is obviously undesirable, under present circumstances, to enter into any details regarding the condition of wireless telegraphy in the Protectorate. We are, however, able to append herewith the Decree issued by the Sultan in 1909.

WIRELESS TELEGRAPHY DECREE.

No. 6 OF 1909.

In the Name of the Most Merciful God.

It is hereby decreed as follows :—

1. (1) No person shall establish any wireless telegraph station or instal any apparatus for wireless telegraphy in any place in our dominions except under and in accordance with a licence granted in that behalf by our First Minister.

(2) Every such licence shall be in such form and for such period as our First Minister may determine, and shall contain the terms, conditions, and restrictions on and subject to which licence is granted, and any such licence may include two or more stations or places.

(3) If any person establishes a wireless telegraph station without a licence in that behalf or instals or works any apparatus for wireless telegraphy without a licence in that behalf, he shall be guilty of an offence against this Decree, and on conviction he shall be liable to a fine not exceeding 1,500 rupees, or to simple imprisonment for a term not exceeding twelve months, or to both, and in either case be liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence, but no proceedings shall be taken against any person under this Decree except by the order of our First Minister.

(4) If the Court is satisfied by information on oath that there is reasonable ground for supposing that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any ship within its jurisdiction without a licence in that behalf, it may grant a warrant to any officer of our police to enter and inspect the station or place or ship, and to seize any apparatus which appears to him to be used, or intended to be used, for wireless telegraphy therein.

(5) Our First Minister may make Regulations for prescribing the form and manner in which applications for licences under this Decree are to be made and fees payable on the grant of any such licence.

2. Where the applicant for a licence proves to the satisfaction of our First Minister that the sole object of obtaining the licence is to enable him to conduct experiments in wireless telegraphy, a licence for that purpose shall be granted, subject to such special terms, conditions, and restrictions as our First Minister may think proper, but shall not be subject to any rent or royalty.

3. No person shall work any apparatus for wireless telegraphy installed on any ship whilst that ship is in the waters of our dominions otherwise than in accordance with regulations made in that behalf by our First Minister, and our First Minister may by any such regulations impose penalties for the breach of any such Regulations not exceeding 150 Rupees for each offence, and may provide for the forfeiture on any such breach of any apparatus for wireless telegraphy installed or worked

on such ship. Save as aforesaid, nothing in this Decree shall apply to the working of apparatus for wireless telegraphy installed on any foreign ship.

4. The term "ship" includes steamers, sailing ships, dhows, lighters, rafts, and every other form of boat. The expression "wireless telegraphy" means any system of communication by telegraph as defined in "The Indian Telegraph Act, 1883" without the aid of any wire connecting the points from and at which the messages or other communications are sent and received.

Provided that nothing in this Decree shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

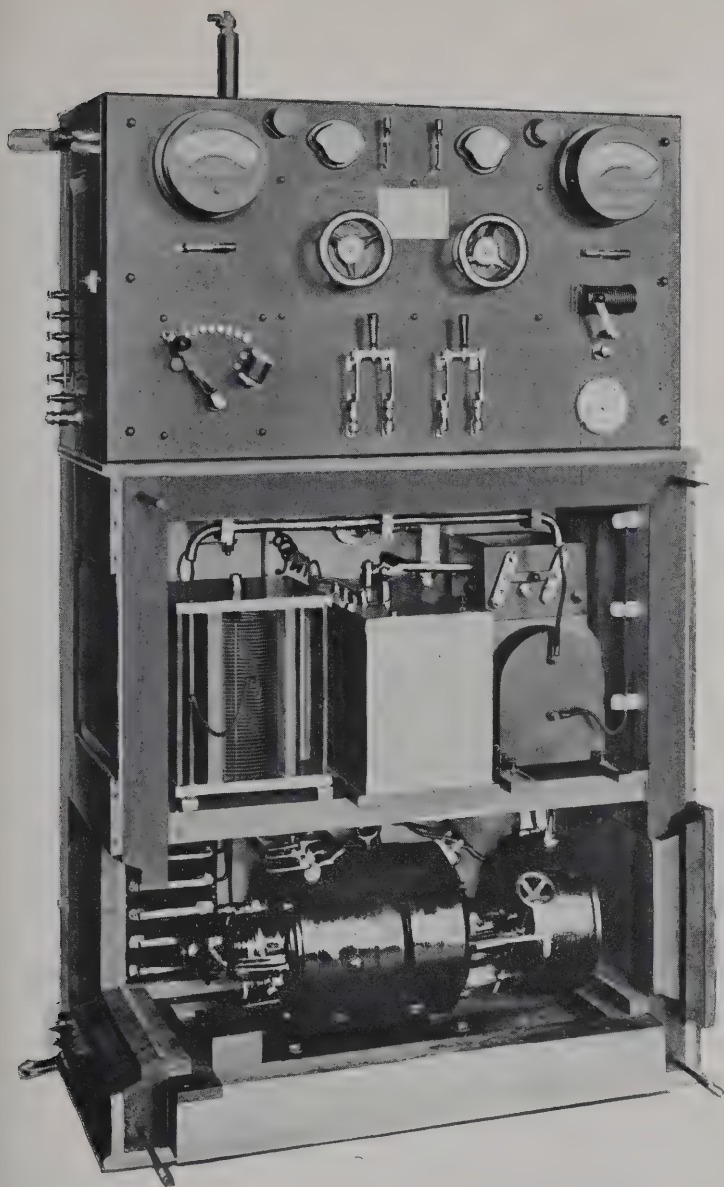
5. This Decree may be cited as "The Wireless Telegraphy Decree, 1909."

Given under our hand and seal this 9th day of February, 1909.

ALI-BIN-HAMOUD.

Countersigned under the provisions of Article 47 of "The Zanzibar Order in Council, 1906."

JOHN H. SINCLAIR,
Acting British Agent and Consul-General.



A $\frac{1}{2}$ -KILOWATT CABINET SET, MANUFACTURED BY THE MARCONI
WIRELESS TELEGRAPH COMPANY OF CANADA.

[To face page 560.]

WIRELESS TELEGRAPH STATIONS OF THE WORLD

A. Land Stations

B. Ship Stations

THE tables of land and ship stations set out in the following pages should be consulted in conjunction with the map of wireless telegraph stations of the world inserted at the end of this book. The stations have been grouped together under the names of the countries to which they are proper, and these countries have been arranged in alphabetical order; therefore no difficulty is likely to be experienced in locating any particular station.

The International Bureau has allotted to signatories of the Convention a list of combinations of letters to be used as call signals for stations proper to the respective countries. The letter limitations of these lists are shown on page 805 together with the name of the countries with which they are connected.

An alphabetical list of call letters for land and ship stations appears on pages 806 to 846. This list indicates upon which page particulars of any station may be found.

Stations of a private or experimental character are omitted, unless exceptional circumstances warrant their inclusion.

In view of the difficulty of obtaining certain information, and the restrictions placed upon us by the Defence of the Realm Act, it has not been possible fully to correct or bring up to date these lists, although every effort has been made to attain the maximum degree of accuracy possible under the circumstances. No responsibility can be accepted, therefore, in this connection.

A. LAND STATIONS.

The following abbreviations are used in the Table of Land Stations below:—Column 2 (Geographical Position): E—East Longitude; W—West Longitude; N—North Latitude; S—South Latitude. Column 7 (Nature of Service): P G—General Public Correspondence; P R—Restricted Public Correspondence; O—Official Correspondence; P—Private Correspondence. Column 8 (Hours of Service): N—Continuous Service; X—No fixed working hours.

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.	
								Per Word.	Minimum Charge.
ABYSSINIA	Meridian of Greenwich.	—	—	Sudan Government	—	—	Local time.	Francs.	Francs.
Gambela ..	..	—	—	..	..	—	..	—	—
ALASKA	Aleutian Islands.	KMW	50	North Pacific Sea Products Co.	300, 525, 600	— 276	X	—	—
Akutan ..	165° 48' 00" W. 54° 08' 00" N.	KML	20-30	North Alaska Salmon Co.	300, 500, 600	P ¹⁰	X	—	—
Alokanok River	156° 37' 50" W. 59° 05' 45" N.	NZY	150	Alaska Engineering Commission	300, 600, 750, 1,000	O	X	—	—
Anchorage, Alaska	Cook Inlet. 146° 50' 00" W. 61° 16' 00" N.	KIZ	300	Alaska Wireless Telegraph Co.	300, 600	P R ¹⁰⁶	..	—	—
Brooks, Alaska 102	149° 30' 00" W. 65° 00' 00" N.	KWW	50	Joseph T. Bauer	300, 550, 600	P 292	..	—	—
Chichagof, Alaska	136° 09' 20" W. 52° 36' 30" N.	KHC	200	Alaska Packers' Association	300, 500, 600, 1,610	— 276	X 285	—	—
Chignik ..	Alaska Peninsula 158° 31' 30" W. 56° 17' 30" N.	WVA	450	U.S. Army ..	600, 1,400	O	..	—	—
Circle City 102 285	144° 04' 18" W. 63° 49' 12" N.	KHG	200	Alaska Packers' Association	300, 400, 500, 600	P 286	X 285	—	—
Clarks Point ..	Bristol Bay 158° 31' 30" W. 58° 50' 45" N.	NPA	400	U.S. Navy ..	600	P G 160 112	N	0.25 223	—
Cordova, Alaska 285	Prince-William Sound 145° 58' 55" W. 60° 27' 45" N.	NPR	150	U.S. Navy ..	600	P G 160 ..	N	0.25 223	—
Dutch Harbor 285	Aleutian Islands, Unalaska 166° 32' 08" W. 53° 53' 14" N.	KMF	100-300	North Alaska Salmon Co.	300, 500, 600	P 10	X	—	—
Egegak ..	152° 39' 00" W. 58° 17' 00" N.	WVB	200	U.S. Army ..	600, 1,400	O	..	—	—
Fairbanks, Alaska 102 285	142° 42' 21" W. 64° 50' 17" N.	..	..	..	..	..	..	—	—
	131° 13' 40" W. 64° 46' 16" N.	..	..	..	..	..	..	—	—

Station	Lat. and Long.	Wavelength	Power	Operator	Frequency	Class	Remarks	Local time	Notes
Fort Yukon, Alaska ²⁵⁵	63° 29' 15" N. 156° 37' 00" W.	WXX	500	U.S. Army	300, 600	P G	Local time: 9 a.m. to 9 p.m.	0.30	
Hales Creek	59° 08' 00" N. 156° 37' 00" W.	KMI	500	U.S. Army	300, 600	P G	Local time: 8 a.m. to 6 p.m.	—	
Holy Cross ²⁵⁵	—	WVK	—	U.S. Army	—	P G	Week days: 11 a.m., 3 p.m., 6 p.m. Sundays and holidays: 11 a.m., 6 p.m.	—	
Iditarod ¹²²	62° 40' 00" N. 158° 00' 00" W.	KIV	200	Alaska Wireless Telegraph Co.	500, 1,650	— ²⁷⁸	Local time: 9 a.m. to 7 p.m.	—	
Jualin	58° 56' 00" N. 135° 00' 00" W.	KJA	100	Jualin Mines Co.	300, 500, 600, 1,980	P G ¹⁸¹	Local time: 8:30 a.m. to 8:45 a.m., 1:30 p.m. to 1:45 p.m., 7:30 p.m. to 7:45 p.m.	0.30	
Juneau, Alaska	58° 10' 00" N. 134° 25' 00" W.	KDU	250-1,500	Marconi Co.	300, 600, 3,000	P G ²⁷⁹	Local time: 8 a.m. to midnight	0.30 ¹⁸⁸ 0.60 ¹⁸⁹	
Kensington, Alaska	58° 06' 54" W. 135° 06' 54" W.	KDN	100-250	Marconi Co.	300, 600, 1,650	P G ⁸⁸	9 a.m. to 9:15 a.m., 1 p.m. to 1:15 p.m., 7 p.m. to 7:15 p.m., N	0.30	
Ketchikan	58° 53' 06" N. 134° 25' 00" W.	KPB	250-1,500	Marconi Co.	300, 600, 1,800, 3,100 ⁴	P G ¹⁶	Local time: 8:30 a.m. to mid-day, 1 p.m. to 5 p.m., and at other hours if necessary	0.30 ¹⁸⁸ 0.60 ¹⁸⁹	
King Cove	55° 20' 45" N. 162° 20' 00" W.	KJK	200	Pacific - American Fisheries Co.	300, 600, 1,610, 2,000	P G ²⁷⁹	Local time: 8:30 a.m. to mid-day, 1 p.m. to 5 p.m., and at other hours if necessary	0.30	
Kodiak ²⁵⁶	55° 05' 00" N. 152° 21' 52" W.	NPS	200	U.S. Navy	600	P G ¹⁰⁰ ¹¹²	Local time: 8:30 a.m. to mid-day, 1 p.m. to 5 p.m., and at other hours if necessary	0.25 ²⁴³	
Koggiung	57° 46' 42" N. 156° 55' 30" W.	KVV	250	Alaska Fishermen's Packing Co.	300, 450, 600	P G	Local time: 6:30 p.m. to 9:30 p.m.	0.30	
Kotlik ²⁵⁴ ²⁵⁵	58° 52' 30" N. 156° 55' 30" W.	WVF	53	U.S. Army	300, 600	P G	Local time: 9 a.m. to 9 p.m. ¹⁸⁹	0.30	
Kvichak, Alaska	63° 02' 30" N. 156° 48' 00" W.	KHB	125	Alaska Packers' Association	300, 400, 500, 600	P ²⁷⁹	April to October X; November to March—X ²⁸⁵	—	
Larsen Bay	59° 03' 00" N. 153° 59' 40" W.	KHA	200	Alaska Packers' Association	300, 500, 600, 1,610	— ²⁷⁸	—	—	
Lafouche, Alaska	57° 37' 30" N. 153° 59' 40" W.	KIM	150	Kennecott Copper Corporation	300, 600, 1,650	P G ¹⁷⁹	1 p.m. to 5 p.m.	0.30	
Metha Nelson ²⁵⁹	58° 45' 00" N. 158° 28' 00" W.	KMP	20	Alaska Packers' Association	300, 500, 600	— ²⁸⁰	X	—	

Land Stations—Continued

Name.	Geographical Position.	Call Signal	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.	
								Per Word.	Minimum Charge.
ALASKA—<i>contd.</i>									
Naknek KHT ..	Meridian of Greenwich. Bristol Bay 157° 00' 00" W. 58° 43' 30" N.	KHT	200	Alaska Packers' Association	300, 500, 800, 1,610	P 288 ..	X 288	—	Francs. —
Naknek KMK ..	156° 25' 00" W. 58° 43' 20" N.	KMK	300	Naknek Packing Co.	300, 500, 800	P 277 ..	X	—	—
Nome, Alaska 254 285 ..	Norton Sound 165° 23' 38" W. 64° 30' 20" N.	WVG	260	U.S. Army ..	300, 800, 2,000 100	P G ..	N	0.30	—
Nulato 193 285 ..	158° 06' 48" W. 64° 43' 30" N.	WVH	950	U.S. Army ..	2,000 100	O ..	—	—	—
Nushagak ..	Bristol Bay 158° 32' 03" W. 58° 42' 00" N.	KMG	100-300	North Alaska Salmon Co.	300, 500, 800	P 10 ..	X	—	—
Petersburg, Alaska 254 285	Alexander Archipelago 133° 57' 06" W. 56° 48' 44" N.	WVI	40	U.S. Army ..	300, 800	P G ..	Local time : 9 a.m. to 9 p.m.	0.30	—
Port Moller ..	160° 40' 00" W. 59° 50' 00" N.	KWR	250	Pacific-American Fisheries	300, 450, 800, 1,610	P G ..	Local time : 6.30 p.m. to 9.30 p.m.	0.30	—
Port Walter ..	154° 40' 00" W. 56° 20' 00" N.	KEQ	100	Alaska Herring & Sardine Co.	300, 525, 800, 1,625	P G 117 ..	X	0.30	—
St. George, Alaska 256 ..	Fribilof Islands 169° 43' 00" W. 56° 30' 00" N.	NPY	40	U.S. Navy ..	600	O 140 ..	X	— 253	259
St. Paul, Alaska 256 ..	Fribilof Islands 170° 16' 20" W. 57° 07' 20" N.	NPQ	200	U.S. Navy ..	600	P G 100 ..	N	0.25 253	—
Sitka, Alaska 256 ..	Alexander Archipelago 135° 20' 55" W. 57° 02' 38" N.	NPB	150	U.S. Navy ..	600	P G 100 100 118 ..	N	0.25 253	—
Snaag Point ..	Bristol Bay 158° 27' 15" W. 59° 02' 30" N.	KHF	200	Alaska Packers' Association	300, 400, 500, 800	P 288 ..	X 288	—	—
Teller ..	157° 35' 00" W. 57° 34' 28" N.	KWT	—	Max. R. Hirschberg	—	— 278	—	—	—
Ugashik ..	Alexander Archipelago	KMU	50-70	Red Salmon Cannery Co.	300, 500, 800	—	X	—	—
Wrangell 254 285 ..		WVJ	40	U.S. Army ..	300, 800	P G 100 ..	Local time : 9 a.m. to 9 p.m.	0.30	—

[illegible]

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.	
								Per Word.	Minimum Charge
ARGENTINE—contd.									
Rio Grande, Tierra del Fuego	Meridian of Greenwich 62° 46' 00" W. 53° 46' 30" S.	LIS	270	Government	300, 600	P G ..	Mean time of the meridian of Cordoba ⁴ Midnight to midday	Francs. 0.60	Francs. 6.00
Rio Santiago, Buenos Aires	Near Buenos Aires 57° 51' 53" W. 34° 50' 57" S.	LIB	270	Government	600	O ..	N	—	—
San Julian, Santa Cruz	67° 43' 57" W. 49° 17' 26" S.	LIM	270	Government	300, 600	P G ..	N	0.60	6.00
Ushuaia	Tierra del Fuego 68° 20' 00" W. 54° 48' 50" S.	LIH	324	Government	300, 600	P G ..	N	0.60	6.00
AUSTRALIAN COMMONWEALTH									
Adelaide Radio	South Australia 138° 31' 00" E. 34° 52' 00" S.	VIA	450	Government	300, 450, 600	P G ^{1 146} ..	Mean time of the meridian 142° 30' east of Greenwich : 6 a.m. to 1 a.m. N	0.30 ²⁴⁷ 248 0.60 ²⁴⁸ 249	—
Brisbane Radio	Queensland 153° 01' 45" E. 27° 25' 30" S.	VIB	450	Government	300, 450, 600	P G ¹ ..	N	0.30 ²⁴⁷ 248 0.60 ²⁴⁸ 249	—
Broome Radio	Western Australia 122° 12' 00" E. 18° 00' 00" S.	VIO	450	Government	300, 450, 600	P G ²⁵⁰ ..	N	0.30 ²⁴⁷ 248 0.60 ²⁴⁸ 249	—
Cooktown Radio	Queensland 145° 15' 30" E. 15° 27' 45" S.	VIC	450	Government	300, 450, 600	P G ²⁵⁰ ..	Mean time of the meridian 150° east of Greenwich : 6 a.m. to 1 a.m. N	0.30 ²⁴⁷ 248 0.60 ²⁴⁸ 249	—
Darwin Radio	Northern Territory 130° 48' 30" E. 12° 27' 30" S.	VID	450	Government	300, 450, 600	P G ²⁵⁰ ..	N	0.30 ²⁴⁷ 248 0.60 ²⁴⁸ 249	—
Esperance Radio	Western Australia 121° 55' 00" E. 23° 51' 00" S.	VIE	450	Government	300, 450, 600	P G ²⁵⁰ ..	Mean time of the meridian 120° east of Greenwich : 6	0.30 ²⁴⁷ 248 0.60 ²⁴⁸ 249	—

40° 01' 00" S.	45°	Government	300, 450, 800	P G 240	Mean time of the meridian 120° east of Greenwich, 9 a.m. to 6 p.m. Sundays, closed.	0.60° (2)
Geraldton Radio ..	VIN	Government	300, 450, 800	P G 240	Mean time of the meridian 120° east of Greenwich, 9 a.m. to 11 p.m.	0.30 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000
Hobart Radio ..	VIH	Government	300, 450, 800	P G 1	Mean time of the meridian 150° east of Greenwich, 9 a.m. to 11 p.m.	0.60 248 249 250

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.	
								Per Word.	Minimum Charge.
AUSTRALIAN COMMON-WEALTH—contd.									
Woodlark Island ..	Meridian of Greenwich. Off New Guinea	—	—	Government	—	P G 364 (m)	—	—	—
Wyndham Radio...	Western Australia 128° 18' 00" E. 15° 35' 00" S.	VIV	450	Government	300, 450, 800	P G 360 ..	Mean time of the meridian 120° east of Greenwich, 6 a.m. to 8 p.m.	0.30 ²⁴⁷ 0.30 ²⁴⁸ 0.60 ²⁴⁹ 0.60 ²⁴⁸	—
*AUSTRIA-HUNGARY									
Castelluovo di Cattaro ..	Adriatic coast Mouths of Cattaro 18° 32' 04" E. 42° 27' 00" N. 13° 50' 08" E. 44° 51' 08" N.	OHC	By day, 250; by night, 500	Government	800, 1,800	P G 16 ..	N	0.20	—
Pola ..	Adriatic coast 15° 53' 03" E. 43° 44' 02" N.	OHP	By day, 250; by night, 500	Government	600	O ..	N	—	—
Sebenico ..	Adriatic coast 15° 53' 03" E. 43° 44' 02" N.	OHB	By day, 250; by night, 500	Government	800, 1,800	P G 16 ..	N	0.20	2.00
Triest ..	13° 45' 30" E. 45° 38' 54" N.	OHT	By day, 150; by night, 300	Government (Imperial Inspectorate of the Radiotelegraph Service, Trieste)	300, 800	P G 16 ..	N	0.20	2.00
AZORES see under PORTUGAL									
BAHAMAS Nassau, Bahamas	77° 22' 00" W. 25° 04' 00" N.	VPN	400	Government	800, 1,800	P G 32 ..	Mean time of the meridian 75° west of Greenwich, 7 a.m. to 3 p.m.	0.30 ²⁵¹	3.00 ²⁵² (j)
BELGIAN CONGO									
Banana ..	Lower Congo 12° 27' 06" E. 6° 00' 21" S.	ONA	400-1,000	Congo State	800, 600	P G ..	Greenwich Time, 7 a.m. to 11.30 a.m., 2 p.m. to 5 p.m. ⁵ Holidays: 7 a.m. to 10.30 a.m., 4 p.m. to 5 p.m. ⁶ 7 a.m. to 11.30 a.m., 4 p.m. to 5 p.m. Sundays and bank holidays: 7 a.m. to 10.30 a.m.	0.30	—
Basankusu ..	District of Lulonga 19° 46' 00" E. 1° 14' 03" N.	OQU	300	Congo State	900, 1,200	—	—	—	—

Station	Lat.	Long.	Alt.	Dist.	Remarks
Boma	23° 36' 00" N. 1° 14' 00" E.	100	300	900	1,200 Congo State — 67 2 p.m. to 5 p.m. Sundays and bank holidays: 7 a.m. to 10.30 a.m., 4 p.m. to 5 p.m. 7 a.m. to 11.30 a.m., 2 p.m. to 5 p.m. Sundays and bank holidays: 7 a.m. to 10.30 a.m., 4 p.m. to 5 p.m. 7 a.m. to 11.30 a.m., 2 p.m. to 5 p.m. Sundays and bank holidays: 7 a.m. to 10.30 a.m., 4 p.m. to 5 p.m.
Coquilhatville	Equateur 18° 18' 00" E. 0° 04' 00" N.	300	300	900	1,200 Congo State — 6 2 p.m. to 5 p.m. Sundays and bank holidays: 7 a.m. to 10.30 a.m., 4 p.m. to 5 p.m.
Elisabethville	Upper Luapula 27° 31' 00" E. 11° 38' 00" S.	300	300	900	1,200 Congo State — 6 2 p.m. to 5 p.m. Sundays and bank holidays: 7 a.m. to 10.30 a.m., 4 p.m. to 5 p.m.
Kabalo	Tanganika Moero 27° 00' 00" E. 6° 07' 00" S.	100	300	600	900 Congo State — 6 2 p.m. to 5 p.m. Sundays and bank holidays: 7 a.m. to 10.30 a.m., 4 p.m. to 5 p.m.
Kikondja	Tanganika Moero 26° 25' 00" E. 8° 15' 00" S.	300	300	900	1,200 Congo State — 6 2 p.m. to 5 p.m. Sundays and bank holidays: 7 a.m. to 10.30 a.m., 4 p.m. to 5 p.m.
Kindu	Maniema 25° 56' 00" E. 2° 56' 00" S.	300	300	900	1,200 Congo State — 6 2 p.m. to 5 p.m. Sundays and bank holidays: 7 a.m. to 10.30 a.m., 4 p.m. to 5 p.m.
Kinshasa	Middle Congo 15° 21' 52" E. 4° 18' 22" S.	300	300	3,800	— 6 2 p.m. to 5 p.m. Sundays and bank holidays: 7 a.m. to 10.30 a.m., 4 p.m. to 5 p.m.
Kengolo	Tanganika, Moero 26° 59' 00" E. 5° 23' 00" S.	300	300	900	1,200 Congo State — 6 2 p.m. to 5 p.m. Sundays and bank holidays: 7 a.m. to 10.30 a.m., 4 p.m. to 5 p.m.
Lusambo	Sankuru 23° 05' 00" E. 5° 00' 00" S.	300	300	900	1,200 Congo State — 6 2 p.m. to 5 p.m. Sundays and bank holidays: 7 a.m. to 10.30 a.m., 4 p.m. to 5 p.m.

* It is naturally impossible to revise particulars concerning enemy countries. The information given below is reprinted as a matter of interest from the text brought up to date at the time of the declaration of war.

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.	
								Per Word.	Minimum Charge.
BELGIAN CONGO—contd.									
Stanleyville ¹⁹² ..	Meridian of Greenwich. Stanleyville 25° 14' 00" E. 0° 30' 00" N.	OQS	300	Congo State ..	900, 1,200	—	7 a.m. to 11.30 a.m., 2 p.m. to 5 p.m. Sundays and bank holidays: 7 a.m. to 10.30 a.m., 4 p.m. to 5 p.m. 7 a.m. to 11.30 a.m., 2 p.m. to 5 p.m. Sundays and bank holidays: 7 a.m. to 10.30 a.m., 4 p.m. to 5 p.m.	Francs, —	Francs, —
Umangi ¹⁹² ..	Rangala 21° 26' 52" E 2° 06' 43" N.	OQI	300	Congo State ..	900, 1,200	—		—	—
BELGIUM									
Nieuport ..	North Sea coast 2° 43' 15" E. 51° 09' 10" N.	OST	By day, 250; by night, 540	Government ..	300, 600	P G ⁷³ ..	N	0.20 ⁸	2.00 ⁸
BERMUDA									
Bermuda ..	64° 45' 00" W. 32° 20' 00" N.	BZB	—	Government ..	—	O ..	—	—	—
BOLIVIA									
Cobija ¹⁹² ..	—	—	—	Government ..	—	—	—	—	—
Jacuba ¹⁹² ..	—	—	—	Government ..	—	—	—	—	—
Puerto Suarez ^{13 192} ..	—	—	—	Government ..	—	—	—	—	—
Riberalta ¹⁹¹ ..	—	—	—	Government ..	—	—	—	—	—
Santa Cruz ^{13 192} ..	—	—	—	Government ..	—	—	—	—	—
Trinidad ^{13 192} ..	—	—	—	Government ..	—	—	—	—	—
Viacha ¹⁹¹ ..	—	—	—	Government ..	—	—	—	—	—
BRAZIL									
Abrolhos ..	Bahia 38° 41' 46" W. 17° 57' 30" S.	SNN	100	Navy ..	300	O ⁸¹³ ..	—	0.60	—
Amaralina ..	Bahia .. 38° 28' 00" W. 13° 01' 00" S.	SPA	400	Government ..	300, 600, 1,000, 2,000	P G ⁸⁴⁴ ..	N	0.60 ^{3 (c)}	6.00 ^{3 (c)}
Anhatomirim ..	S. Catharina 48° 34' 20" W. 27° 25' 32" S.	SOI	600	Navy ..	600, 1,200, 2,000	O ⁸¹³ ..	—	0.60	6.00
Babylonia ..	Rio de Janeiro 22° 20' 10" S. 46° 20' 10" W.	SPY	200	Government ..	300, 600	P G ⁸⁴⁴ ..	N	0.60 ^{3 (d)}	6.00 ^{3 (d)}

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.	
								Per Word.	Minimum Charge.
BRAZIL—contd.									
Olinda, Pernambuco	Meridian of Greenwich. Near Pernambuco 34° 51' 00" W. 8° 00' 35" S.	SPO	590	Government	300, 600	P G ²⁴⁴ .	N	Francs. 0.60 ² (ϵ)	Francs 6.00 ² (ϵ)
Porto Velho ¹⁴⁵	Mato Grosso 63° 55' 00" W. 8° 46' 00" S.	SQV	750	Government	2,400, 3,500	— ⁶	N	—	—
Quartel General	Rio de Janeiro 43° 11' 30" W. 22° 54' 25" S.	PTQ	150	Government	450, 800, 900	— ⁷¹	11 a.m. to 4 p.m., 8 p.m. to 9 p.m.	— ⁷¹	— ⁷¹
Rio Branco ¹⁴⁶	District of Acre 67° 32' 05" W. 9° 58' 28" S.	SQR	210	Government	1,000, 2,000	— ⁶	Fifth time-belt west of the Greenwich belt: 6 p.m. to 6 a.m.	—	—
Santarém, Pará ¹⁴⁸	54° 42' 58" W. 2° 24' 45" S.	SQS	400	Government	800, 2,000	— ⁶	Fourth time-belt west of the Greenwich belt: 6 p.m. to 6 a.m.	—	—
Senna Madureira ¹⁴⁹	District of Acre 68° 39' 35" W. 9° 03' 57" S.	SQN	400	Government	1,500, 3,000	— ⁶	N	—	—
Tarauacá ¹⁴⁸	District of Acre 70° 43' 39" W. 8° 20' 55" S.	SQT	210	Government	1,500, 3,000	— ⁶	Fifth time-belt west of the Greenwich belt: 6 p.m. to 6 a.m.	—	—
Trinidad ¹⁵¹	Rio de Janeiro 43° 24' 52" W. 22° 49' 27" S.	PTV	150	Government Government	450, 800, 900	— ⁷¹	11 a.m. to 4 p.m., 8 p.m. to 9 p.m.	— ⁷¹	— ⁷¹
Xapury ¹⁴⁸	District of Acre 68° 36' 39" W. 10° 39' 10" S.	SQX	210	Government	1,000, 2,000	— ⁶	Fifth time-belt west of the Greenwich belt: 6 p.m. to 6 a.m.	—	—
BRITISH GUIANA									
Demerara	58° 11' 00" W. 6° 49' 24" N.	VPA	430	Government	600	— ⁸⁰	Local time: 8 a.m. to mid-day, 2 p.m. to 5 p.m.	—	—
BRITISH INDIA									
Allahabad ¹⁵²	81° 55' 00" E. 25° 26' 00" N.	—	—	Government	—	—	—	—	—

Delhi 192	22° 35' 00" N. 77° 00' 00" E.	—	300	Government	—	PG 23	—	0.35	—
Diamond Island	28° 44' 00" N. Mouths of the Irawadi	VTD	300	Government	—	PG 23	—	0.35	—
Karachi Radio	94° 15' 00" E. 15° 51' 00" N.	VWK	300	Government	—	PG 23 24	—	0.35	—
Lahore 192	Mouths of the Indus	—	—	Government	—	—	—	—	—
Madras Radio	67° 00' 00" E. 24° 50' 00" N.	VWM	300	Government	—	PG 25	—	0.35	—
Nagpur 192	80° 17' 16" E. 13° 05' 00" N.	—	—	Government	—	—	—	—	—
Peshawar 192	—	—	—	Government	—	—	—	—	—
Port Blair	South Andaman Island	VTP	300	Government	—	PG 25	—	0.35	—
Quetta 192	92° 45' 00" E. 11° 41' 00" N.	—	—	Government	—	—	—	—	—
Rangoon Radio	Lower Burma	VTR	300	Government	—	PG 24	—	0.35	—
Sandheads	96° 07' 00" E. 16° 47' 00" N.	VVS	200	Government	—	PG 23	—	0.35	—
Secunderabad 192	At the south of the Ganges Delta	—	—	Government	—	—	—	—	—
Simla 192	88° 09' 00" E. 21° 00' 00" N.	—	—	Government	—	—	—	—	—
Victoria Point	77° 11' 00" E. 31° 06' 00" N.	VTV	300	Government	—	PG 23	—	0.35	—
BRITISH NEW GUINEA	Extreme south of Lower Burma	—	—	Australian Govern- ment	—	PG 24 (f)	—	—	—
Madang	98° 32' 30" E. 9° 59' 00" N.	VIG	500	Australian Govern- ment	—	PG 23 24 (f)	—	0.30 2 (b) 247	—
Port Moresby Radio	147° 00' 30" E. 9° 28' 30" S.	—	—	—	—	—	—	0.60 2 (b) 248	—
BRITISH SOMALILAND	—	—	—	—	—	—	—	—	—
Aden Radio	Arabia	VPI	250	Colonial Office	—	PG 23	—	0.60	—
Berbera Radio	45° 03' 00" E. 12° 46' 00" N.	VPJ	250	Colonial Office	—	PG 23	—	0.60 2 (b) 248	—
Bulhar	45° 01' 30" E. 10° 26' 00" N.	—	—	Colonial Office	—	—	—	0.60 2 (b) 248	—

Mean time of the me-
ridian 82° 30' east
of Greenwich 27:6:36
a.m. to 6:36 p.m.

Time of the Meridian
of Aden, 3 hours in
advance of
Greenwich time
N

6 a.m. to 6 p.m.
8 p.m. to 8:30 p.m.

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.	
								Per Word.	Minimum Charge.
BRITISH WEST INDIES									
Jamaica (Bowden)	Meridian of Greenwich. 76° 19' 00" W. 17° 53' 00" N.	VPH	200	Direct West India Cable Co.	300, 800	P G ..	Local time ³¹ : 7 a.m. to 7 p.m.	Frans. 0.60	Frans. 6.00
Tobago	60° 40' 00" W. 11° 12' 00" N.	VPM	250	Government	600	P G ³⁰ ..	Local time: 8 a.m. to 5 p.m. Sundays and public holidays: 8 a.m. to midday.	0.60 ^{32(k)} ₃₃	—
Trinidad	61° 30' 00" W. 10° 40' 00" N.	VPL	400	Government	600	P G ³⁴ ..	Local time: 8 a.m. to 10 p.m. Eastern European time. ³⁵	0.60 ^{32(k)} ₃₃	—
*BULGARIA									
Varna	27° 55' 00" E. 43° 12' 00" N.	LZF	270	Government	300, 600	P G ..	9 a.m. to midday, 2 p.m. to 6 p.m.	0.30	3.00
CAMEROONS	9° 40' 50" E. 4° 02' 41" N.	—	—	—	—	P G ³⁶ ..	—	—	—
CANADA AND NEWFOUNDLAND									
Alert Bay	British Columbia, Queen Charlotte Sound, Cormorant Island 126° 55' 36" W. 50° 35' 20" N.	VAF	350	Government, Naval	300, 600, 1,600	P G ⁴⁰ ..	N	0.60 ^{39 41}	—
American Tickle ..	Labrador 53° 28' 00" W. 55° 41' 00" N.	VOC	100	Marconi Co.	600	— ⁶	8 a.m. to 8 p.m. ^{48 128}	0.60	—
Battle Harbour ..	Labrador 55° 36' 00" W. 52° 17' 00" N.	VOA	150	Marconi Co.	300, 600	— ⁶	8 a.m. to 8 p.m. ^{48 128}	0.60	—
Belle Isle	To the north of Newfoundland 55° 21' 49" W. 51° 52' 53" N.	VCM	250	Marconi Co.	300, 800	P G ⁴⁶ ..	N	0.30 ³⁸	—
Camperdown, Nova Scotia	Haliuax 63° 37' 07" W. 44° 31' 11" N.	VCS	250	Marconi Co.	300, 600	P G ^{37 48}	N	0.30 ^{38 37}	—
Cape Bear	Prince Edward Island 62° 27' 15" W. 46° 06' 43" N.	VCP	150	Marconi Co.	300, 600	P G ⁴⁶ ..	December-March ^N April-November, 8 a.m. to 8 p.m. ⁴⁶	0.15 ³⁸	—

Cape Lazo	British Columbia, east coast of Vancouver Island 124° 52' 43" W. 49° 42' 20" N. Newfoundland 53° 04' 17" W. 46° 30' 24" N. Newfoundland 59° 18' 00" W. 47° 37' 00" N. Nova Scotia 65° 37' 15" W. 43° 23' 19" N. Province of Quebec, North shore of River St. Lawrence 66° 37' 17" W. 50° 11' 00" N.	..	VAC	350	Government, Naval	300, 600	P G 46 ..	..	N	0.60 ³⁹ 40 41
Cape Race..	..	..	VCE	500	Marconi Co.	300, 600, 1,600	P G 46 ..	..	N	0.85 ³⁵
Cape Ray	..	..	VCR	350	Marconi Co.	300, 600, 1,600	P G 46 ..	..	N	0.30 ³⁵
Cape Sable	..	..	VCU	250	Marconi Co.	300, 800	P G 37 46	..	N	0.85 ^{35 37}
Clarke City	..	..	VCK	250	Marconi Co.	300, 800	P G 46 ..	..	N 48	0.30 ³⁸
Dead Tree Point	..	..	VAH	200	Government, Naval	300, 800	P G 46 ..	..	8 a.m. to 6 p.m. 44	0.60 ^{39 41}
Digby Island	..	..	VAJ	250	Government, Naval	300, 800	P G 46 ..	..	N	0.60 ^{39 41}
Domino ..	..	..	VOD	150	Marconi Co.	600	— 6	..	8 a.m. to 8 p.m. 45 123	0.60
Estevan, British Columbia	..	..	VAE	500	Government, Naval	300, 800	P G 46	..	N	0.60 ^{39 41}
Fano Point	..	..	VCG	250	Marconi Co.	300, 800	P G 46	..	N 48	0.30 ³⁸
Father Point	..	..	VCF	350	Marconi Co.	300, 800	P G 46	..	N 48	0.15 ³⁵
Fogo ..	..	..	VOJ	250	Marconi Co.	800, 600	— 6	..	8 a.m. to 8 p.m. 45	0.85
Glace Bay	..	..	—	3,125	Marconi Co.	9,000	Transatlantic service	..	N	—
Gonzales Hill	..	..	VAK	250	Government, Naval	300, 600	P G 46	..	N	0.60 ³⁹ 41

* It is naturally impossible to revise particulars concerning enemy countries. The information given below is reprinted as a matter of interest from the text brought up to date at the time of the declaration of war.

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.	
								Per Word.	Minimum Charge.
CANADA AND NEW-FOUNDLAND—cont.									
Grady, Labrador	Meridian of Greenwich 56° 23' 00" W. 53° 48' 00" N.	VOE	150	Marconi Co.	600	— ⁶	8 a.m. to 8 p.m. ^{45 123}	Francs. 0.60	—
Grindstone Island	Gulf of St. Lawrence, Magdalen Islands 61° 54' 20" W. 47° 23' 00" N.	VCN	200	Marconi Co.	300, 800	P G ⁴⁶ ..	8 a.m. to 6 p.m. ⁴⁵	0.30 ³⁵	—
Grosse Isle, Quebec	River St. Lawrence 70° 40' 05" W. 47° 02' 00" N.	VCD	100	Marconi Co.	300, 800	P G ⁴⁶ ..	N	0.15 ³⁵	—
Halifax Dockyard	Nova Scotia 63° 35' 10" W. 44° 39' 30" N.	VAA	—	Government	—	O ..	—	—	—
Harrington, Quebec	Gulf of St. Lawrence 50° 27' 45" W. 50° 26' 39" N.	VCJ	150	Marconi Co.	800, 600	P G ⁴⁶ ..	N ⁴⁵	0.30 ³⁵	—
Heath Point	Gulf of St. Lawrence Anticosti Island 61° 42' 16" W. 49° 05' 20" N.	VCI	250	Marconi Co.	300, 800	P G ⁴⁶ ..	N ⁴⁵	0.30 ³⁵	—
Holton, Labrador	57° 15' 00" W. 54° 35' 00" N.	VOG	150	Marconi Co.	600	— ⁶	8 a.m. to 8 p.m. ^{45 123}	0.60	—
Ikeda Head	British Columbia, Queen Charlotte Islands Moresby Island 131° 07' 34" W. 52° 17' 11" N.	VAI	250	Government, Naval	300, 800	P G ⁴⁶ ..	8 a.m. to midnight ⁴⁶	0.60 ^{39 41}	—
Kingston, Ontario	Barriehead Common 76° 27' 30" W. 44° 14' 04" N.	VBH	350	Marconi Co.	300, 800, 1,600	P G ⁴⁶ ..	N	0.15 ³⁵	—
Le Pas, Manitoba	101° 21' 30" W. 53° 52' 45" N.	VBM	600	Government	900, 1,800 2,400	O ¹³³ ..	X	—	—
Lurcher Lightship	Nova Scotia off Lurcher Shoal 66° 32' 00" W.	VDR	100	Department of Marine	300	O ..	X	—	—

[illegible]

Land Stations—Continued.

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.	
								Per Word.	Minimum Charge.
CANADA AND NEW-FOUNDLAND—cont'd.									
Quebec	Meridian of Greenwich. 71° 12' 26" W. 46° 48' 24" N.	VCC	100	Marconi Co. ..	300, 800	P G ⁴⁶ ..	N	Frans. 0.15 ²⁵	Frans. —
Sable Island	Nova Scotia. 60° 19' 00" W. 43° 56' 18" N.	VCT	300	Marconi Co. ..	300, 800	P G ^{87.48} ..	N	0.85 ^{32.87}	—
Sault Ste. Marie, Ontario	84° 17' 50" W. 46° 31' 05" N.	VBB	350	Marconi Co. ..	300, 800, 1,600	P G ⁴⁶ ..	N	0.15 ²⁵	—
Smokey Tickle	Labrador. 57° 11' 00" W. 54° 26' 00" N.	VOF	150	Marconi Co. ..	600	—	8 a.m. to 8 p.m. ^{45.125}	0.60	—
Three Rivers, Quebec	River St. Lawrence 72° 33' 25" W. 46° 20' 45" N.	VCB	150	Marconi Co. ..	300, 800	P G ⁴⁶ ..	N ⁴⁸	0.15 ²⁵	—
Tobermory, Ontario	Entrance of Georgian Bay 81° 39' 40" W. 45° 15' 57" N.	VBD	350	Marconi Co. ..	300, 800, 1,600	P G ⁴⁶ ..	N	0.15 ²⁵	—
Toronto VBG	Lake Ontario, Toronto Island 79° 22' 53" W. 43° 36' 50" N.	VBG	350	Marconi Co. ..	300, 800, 1,600	P G ⁴⁶ ..	N	0.15 ²⁵	—
Triangle Island	British Columbia south of Hecate Strait 129° 04' 50" W. 50° 51' 48" N.	VAG	450	Government, Naval	300, 800	P G ⁴⁶ ..	N	0.60 ^{39.11}	—
Venison Island	Labrador. 53° 14' 00" W. 55° 46' 00" N.	VOB	100	Marconi Co. ..	600	—	8 a.m. to 8 p.m. ^{45.125}	0.60	—
CEYLON Colombo Radio	79° 53' 00" E. 6° 55' 00" N.	VPB	390	Government ..	300, 800	P G ..	N	0.35	—
CHILI Ancud	73° 52' 00" W. 41° 52' 00" S.	—	—	Government ..	—	—	—	—	—
		CCR	400	Government ..	800, 1,400	P G ..	N	0.60	6.00

Coquimbo	71° 30' 00" W. 29° 57' 35" S.	CCO	400	Government	800, 1,300	P G	..	N	0.60	6.00
Evangelistas	74° 50' 00" W. 52° 47' 00" S.	CCZ	—	Government	—	—	..	—	—	—
Huafu	74° 39' 00" W. 43° 41' 00" S.	CCH	—	Government	—	—	..	—	—	—
Juan Fernandez	78° 53' 00" W. 33° 37' 00" S.	CCF	400	Government	800, 1,300	P G	..	—	0.60	6.00
Llanquihue	72° 55' 00" W. 41° 32' 00" S.	CCL	150, 2,000	Government	800, 2,500, 3,500 5,000	P G	..	N	0.60	6.00
Mocha	Island of Mocha 73° 53' 44" W. 38° 22' 12" S.	CCM	300	Government	600	P G	..	10 a.m. to midday. ¹⁴⁹ 4 p.m. to 6 p.m.	0.60	6.00
Punta Arenas	70° 50' 00" W. 53° 10' 00" S.	CCP	150, 2,000	Government	800, 2,500, 3,500 5,000	P G	..	N	0.60	6.00
Talcahuano	73° 05' 35" W. 36° 44' 00" S.	CCT	700	Government	600, 1,300	P G	..	N	0.60	6.00
Valparaiso	71° 38' 06" W. 33° 01' 06" S.	CCV	300	Government, Naval	300, 800, 1,300 ¹⁸⁰	P G	..	N	0.60	6.00
CHINA Canton	113° 20' 00" E. 23° 10' 00" N.	XNP	By day, 650; by night, 1,300	Government	600, 1,200 1,800, 2,100	P G ¹⁹¹	..	8 a.m. to 10 p.m. ¹⁸⁰	0.50 ² (<i>h</i>)	—
Foochow	119° 18' 00" E. 26° 07' 00" N.	XOW	By day, 650; by night, 1,300	Government	600, 1,200 1,600, 2,100	P G ¹⁹¹	..	8 a.m. to 10 p.m. ¹⁸³	0.50 ³ (<i>o</i>)	—
Kalgan	Chihli 115° 20' 00" E. 40° 45' 00" N.	XQL	By day, 650; by night, 1,300	Government	1,200, 1,600 2,100, 3,000	O	..	N	—	—
Peking NPP ¹⁸⁶	116° 30' 20" E. 39° 54' 50" N.	NPP	150	United States Navy	—	O	..	N	— ³⁴³	— ³⁴³
Peking XPK	116° 27' 00" E. 39° 54' 00" N.	XPK	By day, 650; by night, 1,300	Government	600, 1,200 1,800, 2,100	O	..	N	—	—
Quang-Tchéou-Wan	110° 27' 45" E. of Greenwich 108° 07' 31" E. of Paris	FWA	500	French Govt.	300, 600, 1,800	P G, O	..	Seventh time-belt east of the Green- wich belt: 7 a.m. to 11 a.m., 2 p.m. to 5 p.m. 8 a.m. to 10 p.m. ¹⁸⁸	0.25	2.00
Shanghai	21° 03' 34" N. 121° 20' 00" E.	XSH	200	Government	600	P G ¹⁹¹	..	N	0.50 ⁴ (<i>p</i>)	—
Shanghai-Zikawei	31° 15' 00" N. 121° 25' 48" E.	FFZ	By day, 500; by night, 1,000	Soc. Francaise Radio-electrique (of Paris)	800, 900, 1,800	P G ¹⁹¹	..	N	0.50	—

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.	
								Per Word.	Minimum Charge
CHINA—cont'd.									
Woosung, Kiangsu	Meridian of Greenwich. 121° 25' 00" E. 31° 21' 00" N.	XSG	By day, 650; by night, 1,300	Government	600, 1,200 1,800, 2,100	P G 1 st	N	Francs, 0.50 ² (p)	—
Wuchang	Hupei 114° 23' 00" E. 30° 30' 00" N.	XOC	By day, 650; by night, 1,300	Government	600, 1,200 1,800, 2,100 3,000	O	8 a.m. to 10 p.m. ^{1st}	—	—
COCOS-KEELING ISLANDS									
Cocos	Indian Ocean 96° 53' 20" E. 12° 05' 24" S.	VPK	150	— 50	300, 600	P G	N	0.60	—
COLOMBIA									
Cartagena, Rep. Colombia	74° 30' 00" W. 10° 40' 00" N.	CTG	By day, 600; by night, 1,200	Ges. für Drahtlose Tel.	600, 1,500, 2,000 2,500, 3,000	P G 1 st	6 a.m. to midnight	0.50	—
Santa Marta	—	UCJ	—	United Fruit Co. Government	—	P G	—	0.60	—
San Andres	Caribbean Sea	—	—	—	—	—	—	—	—
COSTA RICA									
Limon	—	X	—	United Fruit Co.	—	P G	—	0.60	—
CUBA									
Guantanamo Bay	South coast of Cuba 75° 08' 30" W. 19° 54' 00" N.	NAW	200	U.S. Navy	600	P G	N	0.30	—
Morro Castle	Havana	M	—	Government	—	P G	—	0.40	—
CURACAO (COLONY OF)									
Aruba	Dutch West Indies 78° 02' 02" W. 12° 31' 05" N.	PJA	103	Government	600	— 51	Local time. 9 a.m. to 11 a.m., 2 p.m. to 4 p.m. Sundays and public holidays: 11-45 a.m. to 12-45 p.m., 9 a.m. to 11 a.m., 2 p.m. to 4 p.m. Sundays and pub.	0.60	—
Bonaire, Ile	Dutch West Indies 68° 16' 15" W. 12° 00' 00" N.	PJB	103	Government	600	— 71	—	0.60	—

[illegible]

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.	
								Per Word.	Minimum Charge.
DUTCH EAST INDIES— <i>contd.</i>									
Balikpapan ..	Meridian of Greenwich. 116° 57' 00" E 1° 19' 00" S.	—	—	Royal Dutch Petroleum Co.	—	—	—	—	—
Koepang ..	Timor, E. 123° 36' 50" E. 10° 00' 30" S.	PKD	420	Government ..	800, 1,600, 2,300	P G ..	Mean time of the Island of Java, 109° 48' 37.05" east of Greenwich: Week days and holidays: 7 a.m. to 8 a.m., 1.30 p.m. to 7 p.m. Sundays: 1.30 p.m. to 7 p.m.	0.40	4.00
Sabang ..	Sumatra, Web Island 95° 20' 06" E. 5° 54' 00" N.	PKA	By day, 400; by night, 800	Government ..	600	P G ..	Mean time of the Island of Java, 109° 48' 37.05" east of Greenwich: Week days and holidays: 7 a.m. to 8 a.m., 1.30 p.m. to 7 p.m. Sundays: 1.30 p.m. to 7 p.m.	0.40	4.00
Sitobondo ..	Java 114° 05' 30" E. 7° 41' 00" S.	PKC	420	Government ..	800, 1,600, 2,300	P G ..	Mean time of the Island of Java, 109° 48' 37.05" east of Greenwich: Week days and holidays: 7 a.m. to 8 a.m., 1.30 p.m. to 7 p.m. Sundays: 1.30 p.m. to 7 p.m.	0.40	4.00
Tarakan ..	117° 30' 00" E. 3° 20' 00" N.	—	—	Royal Dutch Petroleum Co.	—	—	—	—	—
Wolterrede ..	Near Batavia 106° 50' 20" E. 6° 09' 40" S.	PKB	270	Government Marine Dept.	600	P G, O..	Mean time of the Island of Java, 109° 48' 37.05" east of Greenwich: Week days: 8 a.m. to 10 p.m. Sundays and holidays: 9 a.m. to 1 p.m.	0.40 ²⁰⁷	4.00 ²⁰⁷
ECUADOR									
Guayaquil..	—	GPI	—	—	—	P ..	—	—	—
EGYPT									
Port Said ..	32° 19' 00" E.	SUB	350	Lloyd's ..	300, 800	P G ¹⁰ ..	Eastern European time ²⁸	0.60	—

Assib	13° 20' 00" N. 42° 30' 00" E.	—	Italian Government	—	—	—	—	—	—
Massaua	13° 06' 00" N. Red Sea	1,600	Italian Government	4,000	— ⁸⁷ ..	—	—	—	—
	32° 28' 52" E. 15° 36' 30" N								
FAULKLAND ISLANDS									
Port Stanley	57° 49' 15" W. 51° 41' 15" S.	650	Colonial Govt. ..	300, 800	P G	0.60 ⁸ (4)	Local time. (3 hours 55 minutes later than Green- wich time.)	—	—
FANNING ISLAND See under GILBERT AND ELLICE ISLANDS.									
FAROE ISLANDS									
Thorshavn	Island of Stromo	—	—	300, 500 ²¹⁸ 600	— ²¹⁸ ..	—	—	—	—
Tveraa	Island of Sudero	—	—	300, 500 ²¹⁷ 800	— ²¹⁷ ..	—	—	—	—
FERNANDO PO See under SPAIN.									
FJI ISLANDS									
Labasa	170° 24' 00" E. 16° 26' 00" S.	300	Colonial Govt. ..	300, 800	P G ¹⁸	0.60	Fiji Islands time. (12 hours in advance of Greenwich time.)	— ¹⁸	—
Suva	Viti Levu	300	Colonial Govt. ..	300, 800	P G ¹⁸	0.60	— ³⁰⁰	—	—
Taveuni	178° 27' 30" E. 18° 08' 55" S. 179° 59' 15" E. 16° 46' 30" S.	200	Colonial Govt. ..	300, 800	P G ¹⁸	0.60	— ⁴⁰	—	—
FRANCE AND ALGERIA									
Aln El-Turck	To the west of Oran 0° 45' 30" W. of Greenwich 2° 05' 30" W. of Paris	—	Navy	—	O	—	Greenwich time. 9 a.m. to midnight.	—	—
Ajaccio TSF	35° 45' 00" N. 8° 44' 00" E. of Greenwich 6° 24' 00" E. of Paris	350	Navy	600	P G ¹⁰	0.40 ⁶¹	7 a.m. to 10 p.m.	— ⁶¹	—
Boulogne-sur-Mer TSF ..	41° 55' 00" N. 1° 37' 00" E. of Greenwich 0° 43' 00" W. of Paris	160	Government ..	300, 800	P G ¹⁰	0.40 ⁶²	N	— ⁶²	—
	50° 43' 00" N.								

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.	
								Per Word.	Minimum Charge.
FRANCE AND ALGERIA—contd.									
Boussat TSF	Meridian of Greenwich. Near Bordeaux 0° 37' 12" W. of Greenwich 2° 57' 26" W. of Paris 44° 52' 27" N.	FFX	160	Government	300, 800	P G 16 ..	Greenwich time. N	France. 0.40	—
Brest-Arsenal	4° 29' 00" W. of Greenwich 6° 49' 00" W. of Paris 48° 23' 00" N. of Greenwich 4° 33' 20" W. of Paris 6° 53' 34" W. of Paris 48° 19' 58" N. of Greenwich 1° 38' 00" W. of Greenwich 3° 58' 00" W. of Paris 49° 39' 00" N. To the west of Nice 7° 10' 00" E. of Greenwich 4° 50' 00" E. of Paris 43° 39' 00" N. 1° 05' 00" E. of Greenwich 1° 15' 00" W. of Paris 49° 55' 00" N. 2° 22' 00" E. of Greenwich 0° 02' 00" E. of Paris 51° 02' 00" N.	FUB	—	Navy ..	—	— 88	—	—	—
Brest-Kerlaer		FFK	350	Navy ..	600	P G 16 ..	7 a.m. to 10 p.m.	0.40	—
Cherbourg TSF		FFC	350	Navy ..	600	P G 16 ..	N	0.40 88	— 88
Crois-de-Cagnes		FFG	160	Government ..	300, 800	P G 16 ..	N	0.40 88	— 88
Dieppe		FFI	55	State Railway Administration	400	P 44 ..	10 a.m. to 2 p.m. 8.30 p.m. to 11.30 p.m.	—	—
Dunkerque TSF		FFD	350	Navy ..	600	P G 16 ..	7 a.m. to 10 p.m.	0.40 88	— 88

Havre TSF	..	0° 51' 00" E. of Paris	—	Government	..	—	PG ¹⁵ ..	..	—	0.40 ⁶² 0.40	— ⁶²
Lorient TSF	..	36° 45' 00" N. — 3° 21' 00" W. of Greenwich	350	Navy	..	600	PG ..	..	7 a.m. to 10 p.m.		—
Quessant	..	5° 41' 00" W. of Paris	580	Government	..	300, 800	PG ¹⁵ ..	..	N	0.40	—
Porquerolles	..	To the west of Finistere 5° 04' 00" W. of Greenwich	350	Navy	..	600	— ⁶³	..	—	—	—
Port-Vendres	..	7° 24' 00" W. of Paris	—	Navy	..	—	— ⁶³	..	—	—	—
Rochefort TSF	..	48° 28' 00" N. Hyeres Islands 6° 12' 00" E. of Greenwich	350	Navy	..	600	PG ¹⁵ ..	..	7 a.m. to 10 p.m.	0.40	—
S. Maries-de-la-Mer	..	3° 52' 00" E. of Paris	380	Government	..	300, 800	PG ¹⁵ ..	..	N	0.40 ⁶¹	— ⁶¹
Toulon-Ecole	..	42° 59' 00" N. Gulf of Lions	—	Navy	..	—	— ⁶³	..	—	—	—
Toulon-Mourillon	..	3° 06' 00" E. of Greenwich	—	Navy	..	—	— ⁶³	..	—	—	—
	..	0° 46' 00" E. of Paris	—	Navy	..	—	— ⁶³	..	—	—	—
	..	42° 31' 00" N. 0° 58' 00" W. of Greenwich	350	Navy	..	600	PG ¹⁵ ..	..	7 a.m. to 10 p.m.	0.40	—
	..	3° 18' 00" W. of Paris	380	Government	..	300, 800	PG ¹⁵ ..	..	N	0.40 ⁶¹	— ⁶¹
	..	43° 57' 00" N. Gulf of Lions	—	Navy	..	—	— ⁶³	..	—	—	—
	..	4° 26' 00" E. of Greenwich	—	Navy	..	—	— ⁶³	..	—	—	—
	..	2° 06' 00" E. of Paris	—	Navy	..	—	— ⁶³	..	—	—	—
	..	43° 27' 00" N. 5° 55' 00" E. of Greenwich	—	Navy	..	—	— ⁶³	..	—	—	—
	..	3° 35' 00" E. of Paris	—	Navy	..	—	— ⁶³	..	—	—	—
	..	43° 07' 00" N. 5° 55' 00" E. of Greenwich	—	Navy	..	—	— ⁶³	..	9 a.m. to midnight.	—	—
	..	3° 35' 00" E. of Paris	—	Navy	..	—	— ⁶³	..	—	—	—
	..	43° 07' 00" N.	—	Navy	..	—	— ⁶³	..	—	—	—

Land Stations—Continued

Name.	Geographical Position.	Call Signal	Normal Range in Nautical Miles.	Station Controlled by	Wave lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.	
								Per Word.	Minimum Charge.
FRENCH EQUATORIAL AFRICA									
Loango	Meridian of Greenwich. Congo, Pointe Notre 11° 45' 02" E. of Greenwich 9° 22' 48" E. of Paris 4° 46' 49" S.	FGO	By day, 275; by night, 550	—	300, 600, 1,800	P G ..	One hour in advance of Greenwich time. 8 a.m. to 10.30 a.m., 2 p.m. to 4.30 p.m.	Francs. 0.30	Francs. 3.00
FRENCH INDO-CHINA									
Cap Saint-Jacques ..	To the south-east of Saigon 107° 05' 14" E. of Greenwich 104° 45' 00" E. of Paris 10° 20' 00" N.	FCA	450	Government ..	300, 600	P G, O	Seventh time-belt east of the Greenwich belt. 7 a.m. to 11 a.m., 2 p.m. to 5 p.m.	0.25	2.00
Haiphong	105° 54' 18" E. of Greenwich 103° 34' 04" E. of Paris 21° 03' 49" N.	FAO	1,000	Government ..	300, 600, 1,800 2,400, 3,000	P G " O	7 a.m. to 11 a.m. 2 p.m. to 5 p.m.	0.25	2.00
Kien-An	Near Haiphong 106° 41' 59" E. of Greenwich 104° 21' 45" E. of Paris 20° 48' 34" N.	FKA	350	Government ..	300, 600, 1,800	P G, O	7 a.m. to 11 a.m. 2 p.m. to 5 p.m.	0.25	2.00
Tourane	Tourane Bay, Observatory Islet 108° 12' 41" E. of Greenwich 103° 52' 27" E. of Paris 16° 06' 55" N.	FLT	250	Government ..	300, 600, 1,800	P G, O..	7 a.m. to 11 a.m. 2 p.m. to 5 p.m.	0.25	2.00

Locality	Lat.	Long.	By day, 600; by night, 1,200	Govt.	300, 600, 2,000, 2,500	P G 55204 (4)	Local time: mid- night to 2 a.m., 9 a.m. to 9.15 a.m., 10 a.m. to 10.15 a.m., 11 a.m. to 11.15 a.m., 3 p.m. to 3.15 p.m., 4 p.m. to 4.15 p.m., 5 p.m. to 5.15 p.m., 7.45 p.m. to mid- night. Holidays: midnight to 2 a.m., 8 a.m. to 9 a.m., 7.45 p.m. to midnight.	0.40
Atar 192	—	Government	—	P G 6311	First time-belt west of the Greenwich belt.	—
Chinguetti 193	—	Government	—	P G 6311	—	—
Conakry	By day, 540; by night, 1,600	Government	300, 600, 2,000	P G ..	6 a.m. to 10 p.m.	0.30
Dakar	By day, 250; by night, 450	Government	300, 600	P G ..	N	0.30
Port-Etienne	By day, 540; by night, 1,600	Government	300, 600, 2,000	P G 70 ..	from sunrise to sun- set	0.30 70
Rufisque	By day, 540; by night, 1,600	Government	300, 600, 2,000	P G 72 ..	from sunrise to sun- set	0.30
Tabou	150	Government	300, 600, 1,700	P G ..	from sunrise to sun- set	0.30

Land Stations--Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.	
								Per Word.	Minimum Charge.
*GERMANY							Central European time. ⁸⁸	France.	France.
Adlergrund Lightship ..	Meridian of Greenwich. Baltic Sea 14° 22' 12" E. 54° 46' 59" N.	KAG	55	—	300	P R 74 ⁷⁵	N	0.18 ⁷⁴	1.80 ⁷⁴
Anrumbank Lightship ..	North Sea 7° 53' 12" E. 54° 33' 12" N.	KAF	—	—	300, 600	P R 74 ⁷⁵	N	0.18 ⁷⁴	1.80 ⁷⁴
Aussenjade Lightship ..	North Sea 5° 56' 46" E. 53° 51' 30" N.	KAU	55	—	300	P R 74 ⁷⁵	N	0.18 ⁷⁴	1.80 ⁷⁴
Borkum New Lighthouse	North Sea 6° 46' 12" E. 53° 54' 48" N.	KBM	100	—	300, 600	P G 88 ⁸²	N	0.18	1.80
Borkum Riff Lightship ..	North Sea 6° 03' 30" E. 53° 45' 30" N.	KBR	60	—	300, 600	P R 74 ⁷⁵	N	0.18 ⁷⁴	1.80 ⁷⁴
Bremerhaven Lloydhalle	North Sea coast 8° 33' 08" E. 53° 33' 04" N.	KBH	200	Norddeutscher Lloyd Co.	300	P R 76 ⁷⁶	N	0.18	1.80
Bülk	Kiel Bay 10° 12' 00" E. 54° 27' 00" N.	KBK	110	—	300	P G 77 ⁸⁰	N	0.18	1.80
Curhaven	North Sea coast 8° 42' 42" E. 53° 52' 27" N.	KCX	By day, 110; by night, 170	—	300 800	P G 78 ⁸⁸	N	0.18	1.80
Danzig	Baltic Coast 18° 39' 08" E. 54° 20' 56" N.	KAZ	By day, 330; by night, 660	—	300, 800, 1,800	P G 90 ⁹⁰	6 a.m. to midnight. ⁷⁹	0.18	1.80
Eider Lightship	North Sea 8° 18' 18" E. 54° 16' 06" N.	KAJ	30	—	300, 600	P R 74 ⁷⁵	N	0.18 ⁷⁴	1.80 ⁷⁴
Eiderlotsengaliote Light- ship	North Sea 8° 37' 00" E. 54° 13' 30" N.	KCL	21	—	300, 600	P R 74 ⁷⁵	N	0.18 ⁷⁴	1.80 ⁷⁴
Elilwie	—	—	—	Government	—	P R 74 ⁷⁵	N	—	—
Elbe Lightship Eins ..	North Sea 8° 15' 00" E. 54° 00' 30" N.	KBF	60	—	300	P R 74 ⁷⁵	N	0.18 ⁷⁴	1.80 ⁷⁴
Holigoland	North Sea 7° 52' 00" E.	KAH	110	—	300	P R 60 ⁸⁰	N	0.18	1.80

Sassnitz	53° 36' 00" N. Island of Rügen 13° 39' 14" E. 53° 30' 52" N. Usedom Island 14° 15' 13" E. 53° 54' 40" N.	KCV by night, 830 110	Prussian Railway Administration	375	PR 85 80	N	0.18	1.80
Swinemünde	53° 30' 52" N. Usedom Island 14° 15' 13" E. 53° 54' 40" N.	KAW By day, 330; by night, 660 80	—	300, 600, 1,800	PG 80 ..	6 a.m. to midnight, ⁸⁴	0.18	1.80
Weser Lightship	North Sea 7° 49' 03" E. 53° 54' 18" N.	KCW	—	300	PR 74 75	N	0.18 ⁷⁴	1.80 ⁷⁴
GIBRALTAR								
Gibraltar (North Front) ..	5° 21' 00" W. 36° 09' 00" N.	BYW	British Navy ..	—	O ..	—	—	—
Gibraltar (Windmill Hill) ..	5° 21' 00" W. 36° 07' 00" N.	BYX	British Navy ..	—	O ..	—	—	—
GILBERT AND ELLICE ISLANDS								
Ocean Island	160° 35' 00" E. 0° 32' 00" S.	VQK	Australian Govt.	600, 1,800	PG 284 (H) 303 ..	N	0.60	—
Fanning Island	150° 21' 00" W. 3° 51' 00" N.	—	F. R. Pelly ..	300, 600	PR 302 ..	—	0.60	—
Washington Island	161° 10' 00" W. 4° 45' 00" N.	—	F. R. Pelly ..	300, 600	PR 303 ..	—	0.60	—
GOLD COAST								
Accra	0° 12' 00" W. 5° 32' 30" N.	VPG	Government ..	300, 600	PG ..	Greenwich time: 8 a.m. to 4 p.m., ex- cept Sundays	0.40	—
GREAT BRITAIN								
Aberdeen	2° 07' 00" W. 57° 08' 30" N. Ireland, Co. Kerry	BYD	Admiralty ..	—	O ..	Greenwich time.	—	—
Ballyvaun	Ireland, North Channel	—	—	—	P ..	—	—	—
Ballycastle, Antrim	6° 12' 00" W. 55° 11' 00" N.	GSL	Post Office ..	250	— ⁹¹	8.25 a.m. to 8.25 p.m.	—	—

* It is naturally impossible to revise particulars concerning enemy countries. The information given below is republished as a matter of interest from the text brought up to date at the time of the declaration of war.

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.	
								Per Word.	Minimum Charge
GREAT BRITAIN—contd.									
Broomfield, Essex	Meridian of Greenwich, 0° 28' 00" E.	MAX	—	Marconi Co.	—	Experimental..	—	Francs.	Francs.
Bunbeg	31° 45' 00" N. North-west coast of Ireland 8° 09' 00" W.	BYR	—	Admiralty	—	O	—	—	—
Butt of Lewis ..	55° 04' 00" N. 58° 32' 00" N. 6° 14' 00" W.	—	—	Lloyd's ..	—	Private ..	—	—	—
Caister-on-Sea ..	Near Yarmouth 1° 42' 00" E.	GCS	150	Post Office	300, 600	P G ¹⁰ ..	N	0.60 ²² 0.30 ²² 0.15 ²⁴	— ²³ 1.80 ²³ 1.50 ²⁴
Calshot	52° 37' 00" N. Hampshire, to the south-east of Southampton 1° 18' 30" W. 50° 49' 15" N. 5° 11' 32" W.	BZZ	—	Admiralty	—	O	—	—	—
Camarvon	53° 07' 25" N. 5° 28' 38" E.	MUU	—	Marconi Co.	—	Transatlantic Service	N	—	—
Chelmsford	51° 43' 45" N. S.E. of Grimsby 0° 02' 00" W.	MZX	—	Marconi Co.	—	Experimental..	—	—	—
Cleethorpes	53° 31' 00" N. West coast of Ireland 10° 01' 00" W.	BYB	—	Admiralty	—	O	—	—	—
Clifden	53° 31' 00" N. West coast of Ireland 10° 01' 00" W.	MFT	—	Marconi Co.	—	Transatlantic service	N	—	—
Corkbeg	53° 26' 48" N. Entrance to the port of Cork 8° 15' 00" W.	BYQ	—	Admiralty	—	O	—	—	—
Cronarty	51° 49' 00" N. Black Isle 4° 01' 30" W.	BYP	—	Admiralty	—	O	—	—	—
Crookhaven	57° 41' 45" N. South coast of Ireland 9° 46' 00" W.	—	250	Post Office	300, 600	P G ¹⁶ ..	N	0.60 ²² 0.30 ²² 0.15 ²⁴	— ²³ 1.80 ²³ 1.50 ²⁴
Cross Sand Lightship ..	51° 47' 00" N. North-east of Yarmouth	GVA	15	Trinity House	230	Reception and transmission	N	— ²⁵	—

Culver Cliff	BYM	Admiralty	O	N
Dover	BYL	Admiralty	O	—
Dundee	BZW	Admiralty	O	—
Eastchurch	BZU	Admiralty	O	—
East Goodwin Lightship	GVB	Trinity House	Reception and transmission of distress signals	N
Farnborough	BZT	Admiralty	O	—
Fastnet	—	Lloyd's	For signal duty	—
Felixstowe	BYJ	Admiralty	O	—
Fishguard	GRL	Post Office	P G ¹⁰	N
Flannan Islands	—	Lloyd's	Private	—
Folkstone Harbour	GUR	South Eastern and Chatham Railway	P ¹⁰⁰	—
Fort George	BZV	Admiralty	O	—
Grimsby	BYV	Admiralty	O	—
Gull Lightship	GVC	Trinity House	Reception and transmission of distress signals Experimental..	N
Haven, The (Poole)	MHH	Marconi Co	P, restricted to ships of Mid-land Rly Co.	N, during the crossing between Heysham and Belfast
Heysham Harbour	GHH	Midland Railway	O	—
Horsea	BYC	Admiralty	O	—
Hunstanton	GHC	Post Office	Special correspondence	N

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.	
								Per Word.	Minimum Charge.
GREAT BRITAIN—contd.									
Inchkeith	Meridian of Greenwich. Firth of Forth 3° 09' 00" W. 56° 02' 00" N.	BZA	—	Admiralty	—	O	Greenwich time.	—	—
Inishtrahull	55° 25' 00" N. 7° 13' 00" W.	—	—	Lloyd's ..	—	For signal duty	—	—	—
Ipswich	1° 09' 00" E. 52° 05' 00" N.	BYE	—	Admiralty	—	O	—	—	—
Isle of Grain	Kent, mouth of the Thames 0° 43' 00" E. 51° 26' 15" N.	BZY	—	Admiralty	—	O	—	—	—
Kingsnorth	0° 36' 00" E. 51° 25' 00" N.	BZS	—	Admiralty	—	O	—	—	—
Land's End	West coast of Cornwall 5° 40' 13' W. 50° 07' 02" N.	GLD	250	Post Office	300, 800	P G 16 ..	N	0.60 ⁹² 0.30 ⁹³ 0.15 ⁹⁴	— ⁹² 1.80 ⁹³ 1.50 ⁹⁴
Leafeld	1° 33' 42" W. 51° 50' 14" N.	—	—	Marconi Co.	—	Private	—	—	—
Lerwick	Shetland Islands 1° 11' 00" W. 60° 09' 00" N.	BYU	—	Admiralty	—	O	—	—	—
Lochboisdale	Hebrides 7° 16' 00" W. 57° 08' 00" N.	GCB	150	Post Office	300	— ⁹⁷	8 a.m. to 8 p.m., week days only	—	—
Malin Head	North coast of Ireland 7° 21' 00" W. 55° 22' 00" N.	GMH	250	Post Office	300, 800	P G 16 ..	N	0.60 ⁹² 0.30 ⁹³ 0.15 ⁹⁴	— ⁹² 1.80 ⁹³ 1.50 ⁹⁴
Marconi House	London 0° 07' 10" W. 51° 30' 40" N.	—	—	Marconi Co.	—	Private	—	—	—
Newhaven..	0° 04' 00" E. 50° 48' 00" N.	GNV	120	London, Brighton & S.C. Railway	400	— ⁹⁸	10 a.m. to 2 p.m., 8.30 p.m. to 11.30 p.m.	—	—
Niton	Isle of Wight 1° 47' 10" W. 50° 34' 30" N.	GN1	150	Post Office	300, 800	P G 16 ..	N	0.60 ⁹² 0.30 ⁹³ 0.15 ⁹⁴	— ⁹² 1.80 ⁹³ 1.50 ⁹⁴
North Foreland	North of Ramsgate 1° 26' 00" E.,	GNP	150	Post Office	300, 800	P G 16 ..	N	0.60 ⁹² 0.30 ⁹³ 0.15 ⁹⁴	— ⁹² 1.80 ⁹³ 1.50 ⁹⁴

Station	Latitude	Longitude	Altitude	Company	Notes
Pembroke	4° 58' 00" W.	51° 41' 00" N.	—	Admiralty	—
Poldhu	Extremity south-west of England	5° 15' 44" N.	1,000	Marconi Co.	2,800
Porthurno	5° 01' 44" N.	5° 07' 00" W.	—	Eastern Telegraph Co.	—
Portland Bill	5° 33' 00" W.	English Channel	—	Admiralty	—
Portpatrick	5° 27' 00" W.	Isle of Portland	—	Admiralty	—
Portsmouth	5° 32' 00" N.	Scotland	—	Admiralty	—
Portsmouth Signal School	5° 09' 00" W.	North Channel	—	Admiralty	—
Rame Head	54° 50' 00" N.	5° 06' 00" W.	—	Admiralty	—
Rathlin Island	50° 48' 00" N.	Entrance to the port of Plymouth	—	Admiralty	—
Rosyth	4° 13' 00" W.	5° 19' 00" N.	15	Post Office	250
Scarborough	5° 10' 00" W.	North Channel	—	Admiralty	—
Seaforth	55° 17' 00" N.	3° 23' 00" W.	—	Admiralty	—
Sheerness	56° 01' 00" N.	0° 26' 00" W.	—	Admiralty	—
South Goodwin Lightship	54° 16' 00" N.	Liverpool	150	Post Office	300, 800
Stockton	53° 01' 00" W.	53° 28' 00" N.	—	Admiralty	—
Sunk Lightship	Mouth of the Thames	0° 45' 00" E.	15	Trinity House	230
Tobermory	51° 27' 00" N.	Straits of Dover	—	Admiralty	—
	1° 28' 00" E.	51° 09' 00" N.	—	Admiralty	—
	Near Middlesbrough	1° 21' 00" W.	—	Admiralty	—
	South-east of Harwich	54° 34' 00" N.	30	Trinity House	230
	1° 30' 00" E.	51° 51' 00" N.	—	Admiralty	—
	Isle of Mull	6° 04' 00" W.	150	Post Office	300
	56° 36' 00" W.				

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge	
								Per Word	Minimum Charge.
GREAT BRITAIN—contd.							Greenwich time.	Francs.	Francs.
Tongue Lightship	Meridian of Greenwich. North of Margate 1° 23' 00" E. 51° 30' 00" N.	GVP	15	Trinity House	230	Reception and transmission of distress signals	N	—	—
Valencia Island	South-west of County Kerry, Ireland 0° 10' 00" W. 51° 30' 00" N.	—	—	Post Office	—	—	—	—	—
Whitehall, London	North coast of Scotland 3° 05' 00" W. 56° 26' 00" N.	BYA	—	Admiralty	—	O	—	—	—
Wick	Norfolk 1° 44' 15" E. 52° 34' 45" N.	BYG	—	Admiralty	—	O	—	—	—
Yarmouth..		BZX	—	Admiralty	—	O	—	—	—
GREECE									
Athens	23° 43' 13.8" E. 37° 58' 19.7" N.	SXA	—	Government	—	O	—	—	—
Salamis	Island of Salamis 23° 32' 00" E. 37° 58' 15" N.	SXL	—	Government	—	O	—	—	—
Salonique	22° 50' 00" E. 40° 36' 00" N.	SXC	—	Government	—	O	—	—	—
Syra	Island of Syra 24° 56' 33" E. 37° 25' 43" N.	SXS	—	Government	—	O	—	—	—
Thassos	Island of Thassos 24° 43' 30" E. 40° 46' 00" N.	SXT	—	Government	—	O	—	—	—
GUATEMALA (Republic)									
Guatemala City		—	—	—	—	—	—	—	—
Puerto Barrios		—	—	—	—	—	—	—	—
HAWAIIAN ISLANDS							Local time.	—	—
Fort de Keesy	Honolulu Island of Oahu 157° 46' 20" W. 21° 26' 00" N.	WZG	300	U.S. Army	—	O	—	—	—
Hewa Point		KHX	2,500	Federal Telegraph Co.	800, 1,500, 3,000 5,000, 9,000.	P	7:30 a.m. to 11:30 p.m.	0.30 1st 0.60 1st	—

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.	
								Per Word.	Minimum Charge.
INDIA	Meridian of Greenwich.							Francs.	Francs.
Sea BRITISH INDIA									
ITALIAN SOMALILAND									
Barbera ..	42° 16' 15" E. 2° 21' 10" N.	ISN	200	Government	700-750	P G 16 ..	Sunrise to sunset	0.30 ¹⁰⁸	— ¹⁰⁸
Brava ..	Bénadir 44° 02' 04" E. 1° 06' 25" N.	ISC	200	Government	700-750	P G 16 ..	Sunrise to sunset	0.30 ¹⁰⁸	— ¹⁰⁸
Bulo Burti ..	44° 24' 00" E. 3° 52' 00" N.	ISJ	100	Government	600	P G 16 ..	Sunrise to sunset.	0.30	—
Glumbo ..	42° 37' 27" E. 0° 14' 51" S. 43° 39' 31" E. 3° 07' 10" N.	ISD	200	Government	700-750	P G 16 ..	Sunrise to sunset	0.30 ¹⁰⁸	— ¹⁰⁸
Ischia Baidoa ..	Bénadir 46° 10' 43" E. 4° 48' 27" N.	ISH	160	Government	300, 600, 800	P G 16 ..	Sunrise to sunset	0.30 ¹⁰⁸	—
Itala ..	44° 36' 00" E. 3° 48' 00" N.	ISM	100	Government	300	P G 16 ..	Sunrise to sunset	0.30 ¹⁰⁸	— ¹⁰⁸
Lugh ..	45° 31' 01" E. 2° 58' 14" N.	ISO	100	Government	300	P G 16 ..	Sunrise to sunset	0.30 ¹⁰⁸	— ¹⁰⁸
Mahaddai Uen ..	Bénadir 44° 46' 22" E. 1° 42' 40" N.	ISF	160	Government	600	P G 16 ..	Sunrise to sunset	0.30 ¹⁰⁸	— ¹⁰⁸
Maka ..	Bénadir 45° 21' 14.5" E. 2° 02' 13.5" N.	ISB	160	Government	300	P G 16 ..	Sunrise to sunset	0.30 ¹⁰⁸	— ¹⁰⁸
Mogadiscio ISE ..	Bénadir 45° 21' 14.5" E. 2° 02' 13.5" N.	ISE	160	Government	300	P G 16 ..	Sunrise to sunset	0.30 ¹⁰⁸	— ¹⁰⁸
Mogadiscio ISG ..	Bénadir 45° 21' 14.5" E. 2° 02' 13.5" N.	ISG	1,600	Government	4,000	P G 110 16	X	0.30	—
Oddur ..	43° 45' 00" E. 4° 07' 05" N.	ISI	100-150	Government	300, 600	P G 16 ..	6 a.m. to 6 p.m. ²⁴⁵	0.30	—
ITALY									
Ancona Radio ..	13° 31' 20" E. 43° 31' 40" N.	ICA	270	Government	300, 600	P G 16 ..	N	0.30	—
Bologna ..	11° 20' 00" E. 44° 30' 00" N.	IGB	—	Army	—	— ¹⁴⁸	—	—	—
Brindisi Radio ..	Adriatic Sea, Puglie, Province of Lecce	ICE	270	Government	300, 600	P G 16 ..	N	0.30	—

Coastal Radio	IC	ICR	ICM	ICI	IGF	ICB	ICH	IFM	ICF	IGM	ICN	ICP	IFR	ICQ	ICS	ICT	IGT	IGV	ICZ	IFV	ICV
Capo Sperone Radio	..	Sardinia, Island of S. Antioco 8° 24' 42" E. 38° 57' 59" N.	160	—	—	160	215	27	—	—	270	270	27	—	160	—	—	—	—	—	—
Centopozzi Radio	..	Puglie, Province of Roggia	160	—	—	160	215	27	—	—	270	270	27	—	160	—	—	—	—	—	—
Coltano	15° 36' 45" E. 41° 42' 00" N.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Firenze	43° 38' 00" N. 10° 24' 00" E.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Genova Radio	11° 10' 25" E. 43° 40' 36" N.	160	—	—	160	215	27	—	—	270	270	27	—	160	—	—	—	—	—	—
Maddalena Radio	..	8° 56' 02" E. 44° 25' 44" N.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Messina IFM	Straits of Bonifacio Maddalena Island	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Messina ICF	9° 25' 10" E. 41° 12' 50" N.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Milano	15° 37' 27" E. 38° 15' 00" N.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Napoli Radio	9° 10' 05" E. 45° 20' 40" N.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Palermo Radio	14° 15' 36.5" E. 40° 50' 14" N.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Reggio Calabria	13° 16' 40" E. 38° 11' 48" N.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Roma	15° 38' 30" E. 38° 08' 00" N.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
San Cataldo Bari	..	16° 52' 00" E. 41° 08' 00" N.	160	—	—	160	215	27	—	—	270	270	27	—	160	—	—	—	—	—	—
Spezia	12° 22' 00" E. 41° 53' 00" N.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Taranto	17° 15' 05" E. 40° 28' 05" N.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Torino	7° 40' 10" E. 45° 00' 20" N.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Treviso	12° 10' 26" E. 45° 30' 53" N.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Venezia	12° 21' 15" E. 45° 29' 00" N.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Villa San Giovanni	..	Calabria, Strait of Messina 15° 38' 00" E. 38° 10' 00" N.	27	—	—	27	215	27	—	—	270	270	27	—	160	—	—	—	—	—	—
Vittoria Radio	Sicily, Province of Syracuse 14° 31' 50.7" E. 36° 56' 50.7" N.	270	—	—	270	215	27	—	—	270	270	27	—	160	—	—	—	—	—	—

Land Stations—Continued

Name.	Geographical Position	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.	
								Per Word.	Minimum Charge.
JAPAN									
Choshi Radio	Meridian of Greenwich. Hondo, Inuboye Point 140° 51' 12" E. 35° 44' 08" N.	JCS	By day, 450; by night, 1,500	Ministry of Communications	300, 600, 1,800	P G 112 252	N	France. 0.60 114	— 114
Dairenwan	Peninsula of Kwan-tung 121° 53' 15" E. 38° 57' 50" N.	JDA	By day, 350; by night, 1,200	—	300, 600	P G 252	N	0.60 114	— 114
Fukukikaku	Island of Formosa, Formosa Strait 121° 32' 00" E. 23° 18' 00" N.	JFK	By day, 400; by night, 1,200	Ministry of Communications	300, 600	P G 252	N	0.60 114	— 114
Funabashi Radio	Yedo Bay, near Funabashi Chosen, Island Komoto	JJC	—	Ministry of Communications	4,000-7,000	P G 47 O 11	—	—	—
Komoto 208	Chosen, Island Komoto	JKM	By day, 200; by night, 300	—	—	— 194	N	—	—
Maizuru Radio	126° 36' 12" E. 34° 05' 55" N. Wakasa Bay, near Maizuru	JMZ	—	Ministry of Communications	300, 600, 900- 3,500 ft	P G ..	N	0.60 114	— 114
Minamioagarijima	Borodino Islands 131° 15' 00" E. 25° 51' 00" N.	JYU	Day, 200	Toyo Seito Kaisha	300, 600	— 60	Mean time of the meridian 135° E. of Greenwich, 7 p.m. to midnight	—	—
Mokpo 205	Chosen, port of Mokpo 126° 23' 05" E. 34° 47' 03" N.	JMP	By day, 200; by night, 300	—	—	— 194	N	—	—
Osezaki Radio	Kyushu, Goto Islands 128° 37' 08" E. 32° 37' 20" N.	JOS	By day, 450; by night, 1,500	Ministry of Communications	300, 600, 1,800	P G ..	N	0.60 114	— 114
Otchishi Radio	Hokkaido, Pacific coast 145° 30' 20" E. 43° 10' 17" N.	JOC	By day, 450; by night, 1,500	Ministry of Communications	300, 600	P G ..	N	0.60 114	— 114
Rasajima	Kasa Island, 131° 13' 00" E. 24° 29' 30" N.	JSA	By day, 450; by night, 1,500	Ministry of Communications	300, 600, 1,800	P R 252	—	—	—

Shiomisaki Radio	..	Hondo, Kii Channel 135° 46' 08" E. 33° 25' 32" N.	JSM	1,000 By day, 250; by night, 1,000	Ministry of Com- munications	300, 800	P G ..	..	N	0.60 ¹¹⁴	— ¹¹⁴
Shogetsutubo ²²⁵	..	Chosen, port of Chemulpo. 126° 36' 20" E. 37° 28' 19" N.	JSB	By day, 200; by night, 300	—	—	— ¹¹⁴	..	N	—	—
Shoseito ²²⁵	..	Chosen, Island of Shoseito 124° 43' 45" E. 37° 45' 36" N.	JSS	By day, 300; by night, 400	—	—	— ¹¹⁴	..	N	—	—
Tsunoshima Radio	..	Hondo, near Shimonoseki 130° 50' 00" E. 34° 21' 00" N.	JTS	By day, 200; by night, 800	Ministry of Com- munications	300, 800	P G ..	..	N	0.60 ¹¹⁴	— ¹¹⁴
LABRADOR See under CANADA											
LIBERIA (REPUBLIC OF)											
Monrovia FMA	..	10° 49' 36" W. of Greenwich 13° 09' 50" W. of Paris 6° 16' 40" N.	FMA	By day, 280; by night, 550	French Govern- ment	600	P G ..	..	Sunrise to sunset	—	—
Monrovia KAB	..	10° 48' 42" W. 6° 18' 26" N.	KAB	By day, 320; by night, 650	Deutsch-Südameri- kanische Tele- graphengesell- schaft, Cologne	600	P G ..	..	Greenwich time 7 a.m. to midday, 11 p.m. to 1 a.m. Third time-belt east of Greenwich belt, 7 a.m. to 11 a.m., 1:30 p.m. to 5 p.m., 7 p.m. to 9 p.m.	—	—
MADAGASCAR											
Diégo-Suarez	..	North of Madagascar 49° 22' 45" E. of Greenwich 47° 02' 31" E. of Paris 12° 15' 04" S.	FDG	By day, 325; by night, 650	French Govern- ment	300, 800	P G ^{115 116} O ..	..	0.50	—	—
Dzaoudzi	..	Mayotta Island (Comoro Islands) 45° 16' 29" E. of Greenwich 42° 56' 15" E. of Paris 12° 46' 55" S.	FDO	450	French Govern- ment	300, 800	P G ^{116 118}	..	7 a.m. to 11 a.m., 1:30 p.m. to 5 p.m., 7 p.m. to 9 p.m.	0.50	—

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.	
								Per Word.	Minimum Charge.
MADAGASCAR—contd.									
Majunga ..	Meridian of Greenwich. Mozambique Channel 46° 20' 14" E. of Greenwich 44° 00' 00" E. of Paris	FJA	430	French Govern- ment	300, 600	P G 113 116	7 a.m. to 11 a.m., 1.30 p.m. to 5 p.m., 7 p.m. to 9 p.m.	France. 0.50	—
Mutsamudu ..	15° 43' 00" S. Jouanna (Comoro Islands) 44° 24' 27" E. of Greenwich 42° 04' 13" E. of Paris 12° 09' 26" S.	FLU	100	French Govern- ment	600	P G ..	7 a.m. to 11 a.m., 1.30 p.m. to 5 p.m.	0.50	—
MALTA									
Malta Island ²¹² ..	14° 29' 24" E. 35° 55' 17" N.	VPT	200	Eastern Telegraph Co.	300, 600	P G 16 ..	N ¹⁸⁰	0.30	—
Malta, Rinella Bay ..	14° 32' 00" E. 35° 53' 00" N.	BYZ	—	British Navy ..	—	O ..	—	—	—
Malta, S. Angelo ..	14° 31' 00" E. 35° 53' 00" N.	BYV	—	British Navy ..	—	O ..	—	—	—
MARIANNE ISLANDS									
Guam ²¹⁶ ..	144° 44' 08" E. 13° 27' 12" N.	NPN	100	U.S. Navy ..	300, 600	P G ..	N	0.25 ¹⁸³	—
MARSHALL ISLANDS									
Nauru ..	166° 56' 23" E. 0° 25' 43" S.	—	—	—	—	P G ¹⁸⁴ (2)	—	—	—
MARTINIQUE									
Fort de France ..	61° 04' 00" W. 14° 35' 50" N.	FKQ	300	Navy ..	800, 800 ¹⁷ , 1,000 ¹⁷	P G ¹⁸⁴ ..	N	0.30	—
MEXICO									
Acapulco de Guerrero ..	99° 54' 26" W. of Greenwich 0° 42' 46" W. of Tacubaya ¹⁸¹ _{163 162 163 164}	XAK	300	Government ..	600, 900, 1,200	P G ..	Mean time of the me- ridian of Tacubaya ¹⁸¹ 8 a.m. to 10 p.m.	0.30	3.00

Campecho	9° 41' 19" W. of Tacubaya 22° 01' 10" N. 90° 34' 36" W. of Greenwich 8° 35' 24" E. of Tacubaya 19° 51' 46" N. Sonora	300	XAB	Government	600, 900, 1,200	P G 119 119	8 a.m. to 10 p.m.	0.30	.00
Guaymas	19° 58' 00" W. of Greenwich 11° 48' 00" W. of Tacubaya 27° 55' 30" N. Sinaloa	200	XAH	Government	600, 900, 1,200	P G 119 119	8 a.m. to 10 p.m.	0.30	3.00
Mazatlán de Sinaloa	108° 29' 00" W. of Greenwich 7° 19' 00" W. of Tacubaya 23° 16' 00" N. 86° 37' 21" W. of Greenwich 9° 34' 19" E. of Tacubaya 20° 58' 05" N. Quintana Roo	300	XAE	Government	600, 900, 1,200	P G 119 119	8 a.m. to 10 p.m.	0.30	3.00
Merida de Yucatan	88° 25' 00" W. of Greenwich 10° 45' 00" E. of Tacubaya 18° 33' 00" N.	300	XAM	Government	600, 900, 1,200	P G 119 119	8 a.m. to 10 p.m.	0.30	3.00
Payo Obispo	20° 58' 05" N. Quintana Roo 88° 25' 00" W. of Greenwich 10° 45' 00" E. of Tacubaya 18° 33' 00" N.	300	XAC	Government	500, 900, 1,200	P G 119 119	8 a.m. to 10 p.m.	0.30	3.00
S. José del Cabo	South coast of Lower California 109° 42' 00" W. of Greenwich 10° 32' 00" W. of Tacubaya 23° 03' 00" N.	200	XAF	Government	600, 900, 1,200	P G 119 119	8 a.m. to 10 p.m.	0.30	3.00
S. Rosalia de la Baja, California	Lower California 112° 20' 00" W. of Greenwich 13° 10' 00" W. of Tacubaya 27° 24' 00" N.	00	XAG	Government	600	P G 119 119	8 a.m. to 10 p.m.	0.30	3.00
Tampico de Tamaulipas	97° 51' 19" W. of Greenwich 1° 20' 21" E. of Tacubaya 22° 13' 00" N.	300	XAJ	Government	600, 900, 1,200	P G 119 119	8 a.m. to 10 p.m.	0.30	3.00

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.	
								Per Word.	Minimum Charge.
MEXICO— <i>contd.</i>									
Tuxpan de Veracruz ..	Meridian of Greenwich. 97° 21' 05" W. of Greenwich 1° 48' 55" E. of Tacubaya 28° 57' 16" N. of Greenwich 96° 07' 16" W. 3° 02' 44" E. of Tacubaya 19° 10' 50" N.	XAI	300	Government ..	600, 900, 1,200	P G ..	Mean time of the meridian of Tacubaya ¹³¹ 8 a.m. to 10 p.m.	Francs. 0.30	Francs. 3.00
Veracruz de Veracruz ..		XAA	500	Government ..	600, 900, 1,200	P G ¹³ 120	8 a.m. to 10 p.m.	0.30	3.00
MONTENEGRO		—	—	Compagnia di An- tivarì	—	—	—	—	—
Antivari	42° 08' 00" N. 19° 07' 00" E.								
MOROCCO									
(For Spanish possessions in Morocco see under SPAIN.)									
Casablanca, Maroc ..	7° 37' 00" W. of Greenwich 9° 57' 00" W. of Paris 33° 36' 30" N. 9° 46' 00" W. of Greenwich 12° 06' 00" W. of Paris 31° 31' 00" N. 6° 50' 30" W. of Greenwich 9° 10' 30" W. of Paris 34° 02' 15" N. 5° 49' 00" W. of Greenwich 8° 09' 00" W. of Paris 35° 47' 15" N.	CNP	430	Government ..	300, 600	P G ..	Greenwich time. 6 a.m. to midnight	0.25 ² (f)	—
Mogador		CNY	430	Government ..	300, 600	P G ..	6 a.m. to midnight.	0.25 ³ (s)	—
Rabat		CNF	110	Government ..	450	O ..	6 a.m. to 7 a.m., 6 p.m. to 7 p.m.	—	—
Tanger		CNW	430	Government ..	300, 600	P G ..	6 a.m. to midnight.	0.25 ³ (f)	—
NAVASSA ISLAND									
Navassa Island ¹³²	Windward Passage	WON	—	Snares and Trieste	600, 750	— 220		—	X

NEW CALEDONIA Nouméa-Sémaphore	..	163° 27' 32.07" E. of Greenwich 164° 07' 18.07" E. of Paris 22° 16' 12" S.	FQN	By day, 400	Government	..	300, 600	P G	..	Local time: 10 a.m. to 11 a.m., 2 p.m. to 3 p.m., 5 p.m. to 6 p.m., 8 p.m. to midnight.	0.40 ²⁶⁷	—
NEWFOUNDLAND See under CANADA												
NEW IRELAND Kawieng .. .. .	..	—	—	—	Australian Govt.	..	—	P	..	Mean time of New Zealand 123	—	—
NEW ZEALAND Auckland	..	Auckland, Mon- gonui	VLA	By day, 300; by night, 600	Government	..	300, 600, 1,800, 2,500 3,500	O P G 123	..	6.30 p.m. to midnight ³⁰¹	0.57.8 117 123 200	—
Awarua Radio ..	..	173° 18' 00" E. 34° 54' 00" S. Otago, near Bluff Harbour	VLB	By day, 300; by night, 600	Government	..	300, 600, 2,000, 2,500 3,500	P G 123	..	6.30 p.m. to midnight ³⁰¹	0.26.3 123 159 300	—
Chatham Islands	..	168° 23' 00" E. 46° 30' 00" S. 176° 57' 00" W. 43° 57' 00" S.	VLC	300	Government	..	300, 600	P G 123	..	9 a.m. to 1 p.m., 3 p.m. to 5 p.m., 7 p.m. to midnight	0.57.8 117 123 200	—
Wellington Radio	..	174° 46' 30" E. 41° 17' 05" S.	VLW	325	Government	..	300, 600	P G 123	..	N	0.57.8 + 7 123 159 300	—
NIGERIA Lagos .. .. .	..	3° 23' 55" E. 6° 26' 35" N.	VPY	450	African Direct Telegraph Co., Ltd.	..	300, 600	P G	..	Greenwich time: 7 a.m. to 9 p.m.; Sundays: 8 a.m. to 10 a.m., 4 p.m. to 6 p.m.	0.60	—
NORTH BORNEO Sandakan .. .. .	..	118° 07' 00" E. 5° 50' 00" N.	VQB	400	Government	..	300, 600	P G 302	..	Hong Kong zone time 8 a.m. to 11 a.m., 2 p.m. to 5 p.m., (8 p.m. to 10 p.m.) ²⁵⁴ Central European time ¹⁶	0.40	—
NORWAY Bergen Radio ..	..	North Sea coast 5° 22' 00" E. 66° 24' 30" N.	LGN	By day, 270; by night, 800	Government	..	600	P G	..	N	0.14	1.40
Flekkerö .. .. .	..	Skager Rak, near Christiansand 7° 59' 00" E. 58° 04' 05" N.	LDF	By day, 160; by night, 50	Government	..	600	P G	..	N 124	0.14	1.40

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.	
								Per Word.	Minimum Charge.
NORWAY—contd.								Francs.	Francs.
Ingø Radio	Meridian of Greenwich. To the west of North Cape 24° 09' 20" E. 71° 04' 25" N.	LEI	480	Government	600	P G	N ^{1st} 8 a.m. to 9 p.m. ^{1st}	0.20	2.00
Karlöhansvern	Christiania Fjord	LBZ	—	Government	—	O	—	—	—
Röst	Lofoden Islands 12° 04' 45" E. 67° 30' 24" N.	LFR	35	Government	600	P G ^{1st}	9 a.m. to 1 p.m., 4 p.m. to 7.30 p.m. Holidays: 8 a.m. to 10 a.m.	0.14	1.40
Sörvaagen	Lofoden Islands 13° 02' 00" E. 67° 53' 30" N.	LEN	35	Government	600	P G ^{1st}	9 a.m. to 1 p.m., 4 p.m. to 7.30 p.m. Holidays: 8 a.m. to 10 a.m.	0.14	1.40
Spitsbergen	Green Harbour 14° 14' 27" E. 78° 02' 26" N.	LFG	480	Government	600	P G	N ^{1st} 8 a.m. to 9 p.m. ^{1st}	0.20	2.00
Stavanger ^{1st}	5° 45' 00" E. 58° 58' 00" N.	—	—	Government	—	—	—	—	—
Tjömö	Christiania Fjord 10° 24' 05" E. 59° 03' 05" N.	LET	By day, 160; by night, 50	Government	600	P G	N ^{1st}	0.14	1.40
PANAMA (Canal Zone)									
Balboa ^{1st}	Pacific Entrance of the Panama Canal 79° 33' 30" W. 8° 57' 00" N.	NPJ	200	U.S. Navy	600	P G	N	0.30 ^{2nd}	—
Colon ^{2nd}	Atlantic Entrance of the Panama Canal 79° 54' 07" W. 9° 22' 08" N.	NAX	400	U.S. Navy	600	P G	N	0.30 ^{2nd}	—
Darien, Panama ^{2nd}	79° 46' 40" W. 9° 07' 20" N.	NBA	1,000	U.S. Navy	—	O ^{2nd}	N	—	—
PARAGUAY Asuncion				Government					

Cachendo ..	..	..	OAB	By day, 650; by night, 1,800	Government	600, 3,500	P G	..	..	0.14	—
Callao ..	..	..	OAA	By day, 180; by night, 480	Government	600	P G	..	8 a.m. to noon, 2 p.m. to 5 p.m., 7 p.m. to 10 p.m.	0.12 219	219
Chala ..	..	..	OAC	By day, 240; by night, 600	Government	600, 760	P G	..	8 a.m. to noon, 2 p.m. to 5 p.m., 7 p.m. to 10 p.m.	0.12 219	219
Ilo ..	..	..	OAL	By day, 240; by night, 600	Government	600, 730	P G	..	8 a.m. to noon, 2 p.m. to 5 p.m., 7 p.m. to 10 p.m.	0.12 219	219
Iquitos 193	..	..	OAY	By day, 900; by night, 2,400	Government	600, 1,500, 2,000, 2,500, 3,000, 3,500	P G	..	8 a.m. to midnight.	0.24 219	219
Masisea 193	..	..	OAM	240	Government	2,000	P G	..	6 a.m. to 5 p.m.	0.24 219	219
Orellana 193	..	..	OAO	240	Government	2,000	P G	..	6 a.m. to 5 p.m.	0.24 219	219
Pisco ..	..	..	OAP	By day, 180; by night, 480	Government	600	P G	..	8 a.m. to noon, 2 p.m. to 5 p.m., 7 p.m. to 10 p.m.	0.12 219	219
Putumayo 193	..	..	OAU	600	Government	2,000	P G	..	7 p.m. to midnight.	0.24 19	219
Puerto Bermudez 193	..	..	OAE	240	Government	2,000	P G	..	6 a.m. to 5 p.m.	0.24 19	219
Requena 193	..	..	OAQ	240	Government	2,000	P G	..	6 a.m. to 5 p.m.	0.24 219	219
San Cristóbal (Lima)	..	..	OAZ	By day, 900; by night, 2,400	Government	600, 1,500, 2,000, 3,000, 3,500, 4,000	P G	..	8 a.m. to midnight	0.12 219	219
PHILIPPINE ISLANDS											Frans.
Cavite 286	..	..	NPO	150	U.S. Navy	—	O	..	Mean time of the meridian 120° east of Greenwich. N	— 263	263
Cuyo 289	..	..	WVX	150	Government	600, 1,200	O	..	7 a.m. to 6.15 p.m.	—	—
Davao 359	..	..	WVO	200	Government	600, 1,200	O	..	7 a.m. to 6 p.m.	—	—
Fort Drum 286	..	..	WVP	50	U.S. Army	—	O	..	—	—	—

Meridian of
Greenwich.
120° 55' 00" E.
14° 28' 55" N.
121° 00' 20" E.
10° 51' 25" N.
Mindanao
125° 30' 20" E.
7° 04' 00" N
Manila Bay,
El Fraile Island
120° 37' 43" E.
14° 18' 23" N.

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.	
								Per Word.	Minimum Charge
PHILIPPINES —contd.									
Fort Frank ²⁵⁵	Meridian of Greenwich. Manila Bay, Carabao Island 120° 56' 45" E. 14° 56' 20" N.	WVL	50	U.S. Army	—	O	—	Francs.	—
Fort Hughes ²⁵⁵	Manila Bay, Caballo Island 120° 34' 40" E. 14° 22' 52" N.	WVM	50	U.S. Army	—	O	—	—	—
Fort Mills WVN ²⁵⁶	Manila Bay 120° 34' 40" E. 14° 22' 52" N.	WVN	1,000	U.S. Army	300, 600	PG	6 a.m. to 10 p.m.	0.30	—
Fort Mills WVZ ²⁵⁵	Manila Bay Corregidor Island. 120° 34' 40" E. 14° 22' 52" N.	WVZ	35	U.S. Army	600, 825	O	6 a.m. to 10 p.m.	—	—
Fort Wint ²⁵⁵	Manila Bay, Grande Island 120° 13' 25" E. 14° 46' 15" N.	WVR	50	U.S. Army	—	O	—	—	—
Fort Wm. McKinley ²⁵⁵	Luzon 121° 03' 00" E. 14° 33' 40" N.	WVQ	50	U.S. Army	600	O	—	—	—
Isabela de Basilan Jolo ²⁵⁵	Jolo Island 6° 02' 40" N. 124° 04' 10" E.	KHI WVS	30 400	Government Government	— 600	PG PG	8 a.m. to 5.30 p.m. 7 a.m. to 5.15 p.m.	— —	— —
Malabang ²⁵⁹	Mindanao 7° 35' 20" N. Luzon	WVT	200	Government	600, 1,200	PG	7 a.m. to 7.30 p.m.	—	—
Manila ²⁵⁶	120° 58' 47" E. 14° 55' 48" N.	WVU	200	U.S. Army	600	O	—	—	—
Olongapo ²⁵⁶	120° 16' 57" E. 14° 49' 26" N.	NPT	200	U.S. Navy	—	O	N	— ²⁵³	— ²⁵³
Puerto Princesa ²⁵⁹	Paragua 118° 42' 40" E. 9° 44' 00" N.	WVV	150	Government	800, 1,200	PG	7 a.m. to 6 p.m.	—	—
Sau José, Mindoro ²⁵⁹	121° 03' 00" E. 12° 27' 30" N.	WVY	200	Government	600	PG	7 a.m. to 6.15 p.m.	—	—
Zamboanga ²⁵⁹	Mindanao 122° 02' 19" E. 6° 55' 10" N.	WVW	400	Government	600, 1,200	PG	7 a.m. to 7.30 p.m.	—	—

San Juan, Porto Rico ¹⁸⁸	66° 05' 38" W. 18° 28' 04" N.	200	U.S. Navy	..	600	P G ..	..	0.30	—	meridian 75° west of Greenwich: 8 a.m. to midday, 2 p.m. to 5 p.m. Sundays: 9 a.m. to midday, 7 p.m. to 8 p.m. N
PORTUGAL										
Corvo ..	Azores 31° 07' 35" W. 39° 40' 10" N.	65	Government	..	300, 600	— 118	..	—	— 124	—
Faial ..	Azores 28° 44' 10" W. 38° 38' 00" N.	130	Government	..	300, 600	P G ¹³² ..	..	0.40	N	—
Flores ..	Azores 31° 08' 10" W. 39° 27' 35" N.	130	Government	..	300, 600	P G ¹³² ..	..	0.40	N	—
Lisbon CRF ..	39° 08' 20" W. 38° 43' 18" N.	190	Government	..	300, 450, 600	P G ..	..	0.40	N	—
Lisbon ..	—	—	Government	..	—	P G, O. ..	..	—	—	—
Porto ..	8° 42' 15.9" W. 41° 10' 35.7" N.	400	Government	..	300, 600	P G ..	..	0.40	N	—
Santa Maria ..	Azores 25° 08' 20" W. 36° 59' 55" N.	65	Government	..	300, 600	P G ¹³² ..	..	0.40	N	—
San Miguel ..	Azores 25° 42' 50" W. 37° 44' 30" N.	65	Government	..	300, 600	P G ¹³² ..	..	0.40	N	—
PORTUGUESE EAST AFRICA										
Inbambane ..	Province of Mozambique 35° 22' 50" E. 23° 51' 55" S.	300	Government	..	300, 600	P G ..	..	0.60	Mean time of the me- ridian 30° east of Greenwich: 8 a.m. to midnight	—
Lourenço Marques ..	Province of Mozambique 32° 35' 30" E. 25° 38' 05" S.	100	Government	..	300, 600	P G ..	..	0.60	8 a.m. to 11 a.m., 2 p.m. to 5 p.m.	—
Mozambique ..	Province of Mozambique 40° 45' 06" E. 15° 01' 47" S.	300	Government	..	300, 600	P G ..	..	0.60	N	—
ROMANIA										
Constantza-Tunnel ..	28° 30' 03" E. of Greenwich 26° 19' 10" E. of Paris 44° 10' 32" N.	240	State Maritime Service	..	600	P R ¹³³ ..	..	0.15	N, during the voy- ages of the Rou- manian ships	1.50

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Per Word.	Coast Charge
RUSSIA	Meridian of Greenwich.						Time of Petrograd, 2 hours in advance of Greenwich time		
Anadyr ..	175° 35' 00" E.	RNR	130	—	300, 420, 800	P G ..	11 a.m. to 7 p.m.	Francs. 0.60	—
Arkangel..	64° 34' 00" N. Mouth of the Dwina	RQA	250	—	300, 420, 800	P G ..	8 a.m. to 10 a.m., midday to 2 p.m., 8 p.m. to midnight	0.60 130	— 130
Batoum ..	40° 30' 00" E. 64° 32' 00" N. Black Sea	REI	—	—	—	O ..	—	—	—
Fort d'Alexandrovsk ..	41° 40' 00" E. 41° 56' 00" N. Coast of the Caspian Sea	RNF	160	—	300, 420, 800	P G ..	5.50 a.m. to 9.50 a.m., 11.50 a.m. to 3.50 p.m.	0.60	—
Hapsal ..	50° 16' 40" E. 44° 30' 14" N. Isthmia	REC	—	—	—	O ..	—	—	—
Helsingfors ..	23° 48' 00" E. 59° 00' 00" N. 24° 57' 00" E.	REB	—	—	60	O ..	—	—	—
Kerbinskaia ..	60° 27' 00" N. River Angoum, a tributary of the Amur	RPN	170	—	—	— 108	X	—	—
Kerch ..	136° 29' 18" E. 52° 20' 07.5" N. Crimea	REH	—	—	—	O ..	—	—	—
Kronstadt..	36° 27' 00" E. 45° 38' 00" N. 29° 47' 00" E.	REA	—	—	360	O ..	—	—	—
Libau RED	59° 59' 00" N. 21° 05' 00" E.	RED	—	—	360	O ..	—	—	—
Libau ROL	56° 30' 00" N. Baltic Sea	ROL	170	—	300, 420, 800	P G ..	6 a.m. to 10 p.m.	0.60	—
Mare-Sale	20° 50' 00" E. 56° 31' 40" N. Kara Sea, Vainal Peninsula	RTM	150	—	300, 420, 800	G ..	8 a.m. to 10 a.m., midday to 2 p.m., 8 p.m. to midnight.	c. 60 131	— 131

Narshkan ..	Sea of Okhotsk 139° 39' 00" E. 61° 33' 00" N On the Amur	RNN	130	—	300, 420, 600	P G ..	..	11 a.m. to 7 p.m.	0.60	—
Nicolaiewsk RAU	..	RAU	—	—	—	O ..	..	—	—	—
Nicolaiewsk RNL	..	RNL	240	—	300, 600	P G 126	..	N	0.60	—
Odessa ..	Mouth of the Amur 140° 42' 54.4" E. 53° 08' 19.3" N.	RAR	—	—	—	O ..	..	—	—	—
Okhotsk ..	Sea of Okhotsk 143° 20' 00" E. 59° 22' 00" N.	ROT	130	—	300, 420, 600	P G ..	..	5 a.m. to 9 p.m.	0.60	—
Pétropavlovsk ..	Kamchatka 158° 38' 45" E. 53° 00' 10" N.	RPK	240	—	300, 600	P G ..	..	N	0.60	—
Petrograd ..	Coast of the Caspian Sea 47° 30' 00" E. 42° 59' 20" N.	ROK	160	Government	300, 420, 600	P G ..	..	5.50 a.m. to 9.50 a.m., 11.50 a.m. to 3.50 p.m.	0.60	—
Pétrowsk Daghestan ..	..	—	—	—	—	—	..	—	—	—
Prenté ..	Aland Islands 20° 21' 00" E. 60° 16' 00" N.	REF	—	—	360	O ..	..	—	—	—
Rade d'Astrakhan ..	Caspian Sea 47° 25' 00" E. 45° 15' 00" N.	RQT	110	—	300, 420, 600	P G ..	..	5.50 a.m. to 9.50 a.m., 11.50 a.m. to 3.50 p.m. 130	0.13	— ¹³⁰ 140
Rade de Taganrog ..	Sea of Azov 38° 14' 10" E. 46° 59' 50" N.	ROE	110	—	300, 420, 600	P G 146..	..	6 a.m. to 10 p.m.	0.60 ¹³⁰ 140	—
Reval ..	46° 59' 50" N. 24° 35' 00" E.	ROR	170	—	300, 420, 600	P G ..	..	6 a.m. to 10 p.m.	0.60	—
Rīga ..	59° 20' 00" E. 24° 06' 15" E.	RRG	160	—	300 420, 600	P G 137..	..	6 a.m. to 10 p.m.	0.60	—
Rouno ..	Gulf of Riga 56° 59' 53" N. 23° 15' 40" E.	RRN	70	—	300, 420, 600	P G ..	..	8 a.m. to midday, 2 p.m. to 5 p.m., 8 p.m. to 9 p.m.	0.60	—
Sébastopol ..	57° 48' 00" N. 33° 33' 00" E.	REG	—	—	360	O ..	..	—	—	—¹³⁰ 140
Taganrog ..	Sea of Azov 44° 37' 00" N. 38° 48' 00" E.	RRT	170	—	300, 420, 600	P G 146..	..	6 a.m. to 10 p.m.	0.60 ¹³⁰ 140	—
Vaigatch ..	Vaigatz Island 47° 12' 00" N. Kara Strait 58° 48' 00" E.	RTV	150	—	300, 420, 600	P G ..	..	8 a.m. to 10 a.m., midday to 2 p.m., 8 p.m. to midnight.	0.60 ¹³⁰ 140	— ³
Vladivostok RAS	70° 23' 46" N. 131° 54' 00" E.	RAS	—	—	1,200 approxi- mately	O ..	..	—	—	—
Vladivostok REJ	43° 06' 00" N. 131° 53' 22.5" E.	REJ	—	—	360	O ..	..	—	—	—
Whorng ..	43° 06' 49.2" N. 28° 49' 00" E. 61° 00' 00" N.	RAW	—	—	1,200 approxi- mately	O ..	..	—	—	—

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge	
								Per Word.	Minimum Charge.
RUSSIA—contd.									
Yougorski-Char ..	Meridian of Greenwich. Kara Sea, Jugor Strait 60° 45' 42" E. 60° 49' 07" N.	RTU	150	—	300, 420, 800	P G ..	Time of Petrograd 2 hours in advance of Greenwich time. 8 a.m. to 10 a.m., midday to 2 p.m., 8 p.m. to midnight.	Francs. 0.60 130	Francs. — 130
SALVADOR Las Lomas de Candelaria	—	—	—	Government ..	—	—	—	—	—
SAMOA ISLANDS Apia .. Tutuila ..	— 171° 05' 00" W. 14° 00' 00" S.	MG NPU	—	— U.S. Navy	300, 800 800, 750	P G 344 (a) P G 370 390	— N	— 0.30	— —
SAN DOMINGO See DOMINICAN REPUBLIC									
SIAM Bangkok ..	100° 32' 00" E. 13° 44' 30" N.	HGA	By day, 300; by night, 600	Government ..	300, 800. 1,600, 1,800	O ..	—	0.40	4.00
Singora ..	Gulf of Siam, Malay Peninsula 100° 38' 00" E. 7° 12' 00" N.	HGB	By day, 300; by night, 600	Government ..	300, 800. 1,600, 1,800	O ..	—	0.40	4.00
SIERRA LEONE Sierra Leone ..	13° 14' 00" W. 8° 30' 00" N.	VPU	250	African Direct Telegraph Co., Ltd. ..	300 800	P G ..	Greenwich time, 7 a.m. to 9 p.m. Sundays; 8 a.m. to 10 a.m., 4 p.m. to 6 p.m.	0.60	—
SOLOMON ISLANDS Kieia .. Tulagi ..	Bougainville Island Florida Island	—	—	Australian Govt. Australian Govt.	—	P G 344 (c) P G 344 (i)	—	—	—
SOUTH AFRICA (UNION OF) Capetown .. Durban ..	18° 19' 00" E. 34° 09' 00" S. 31° 03' 50" E.	VNC VND	350 250	Government .. Government ..	300, 800 300, 800	P G 141 111 P G 141	N N	0.60	—

Aranjuez ..	39° 34' 00" W. 3° 40' 32" W.	..	..	EAA	430	Compania Nacional de T.S.H.	300, 600, 2,130	PG	..	..	0.45	4.50
Barcelona EAB	40° 01' 48" N. 2° 06' 28" E.	..	..	EAB	430	Compania Nacional de T.S.H.	300, 600, 2,300	PG	..	..	0.45	4.50
Barcelona EGE	41° 18' 42" N. 2° 03' 52" E.	..	..	EGE	430	Army ..	600, 1,000, 1,600	O	..	..	—	—
Bilbao ..	41° 23' 08" N. 2° 55' 34" W.	..	..	EGH	320	Army ..	600, 1,200, 1,600	O	..	..	—	—
Cabo de Palos ..	43° 23' 53" N. 0° 40' 00" W.	..	..	EAP	202	Compania Nacional de T.S.H.	300, 600, 1,800	PG	..	..	0.45	4.50
Cabo Finisterre 148	37° 38' 06" N. 9° 16' 18" W.	..	..	EAF	210	Compania Nacional de T.S.H.	300, 600, 1,800	PG	..	..	0.45	4.50
Cabo Mayor ..	42° 52' 46" N. 3° 48' 30" W.	..	..	EAS	108	Compania Nacional de T.S.H.	300, 600, 1,800	PG	..	..	0.45	4.50
Cádiz ..	36° 17' 42" W. 3° 30' 00" N.	..	..	—	6	—	70	P 148	..	..	—	—
Cádiz EAC	36° 31' 30" N. 6° 16' 14" W.	..	..	EAC	860	Compania Nacional de T.S.H.	300, 600, 2,540	PG	..	..	0.45	4.50
Cartagena ..	36° 29' 45" N. 0° 59' 18" W.	..	..	FBX	210	Army ..	600, 900, 1,000, 1,200, 1,600	O	..	..	—	—
Coruña ..	37° 35' 36" N. 8° 24' 13" W.	..	..	EGJ	430	Army ..	600, 1,200, 1,600	O	..	..	—	—
Guadalajara ..	43° 24' 23" N. 3° 16' 09" W.	..	..	EGZ	54	Army ..	900	O	..	..	—	—
Huelva ..	40° 37' 54" N. —	..	..	—	—	Compania Nacional de T.S.H.	—	—	..	..	—	—
La Carraca ..	Gulf of Cadiz 6° 10' 50" W. 36° 20' 30" N.	..	..	CLZ	60	Navy ..	300, 600, 1,200	O	..	..	—	—
Las Palmas ..	18° 22' 12" W. 28° 00' 00" N.	..	..	EAL	860	Compania Nacional de T.S.H.	300, 600, 2,540	PG	..	..	0.45	4.50
Le Ferrol 14	8° 14' 05" W. 43° 28' 52" N.	..	..	EBW	440	Army ..	600, 900, 1,200 1,600, 1,800	O	..	..	—	—
Madrid EBZ	3° 43' 00" W. 40° 25' 00" N.	..	..	EBZ	15	Navy ..	225, 300	O	..	..	—	—
Madrid EGC	3° 50' 30" W. 40° 24' 30" N.	..	..	EGC	540	Army ..	600, 900, 1,600, 2,000, 2,500	O	..	..	—	—
Mahon ..	4° 22' 39" E. 39° 52' 29" N.	..	..	EGI	320	Army ..	600, 1,200, 1,600	O	..	..	—	—
Malaga ..	—	..	..	—	—	Compania Nacional de T.S.H.	—	PG	..	..	—	—
Matagorda ..	Gulf of Cadiz 6° 14' 54" W. 36° 31' 30" N.	..	..	—	6	—	70	P 148	..	..	—	—
San Fernando Cádiz	Majorca 2° 45' 40" E. 39° 45' 15" N.	..	..	EBY EAO	— 270	Compania Nacional de T.S.H.	— 300, 600	O PG	.. ..	..	0.45	4.50

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.	
								Per Word.	Minimum Charge.
SPAIN—contd.									
Tenerife ..	Meridian of Greenwich. 16° 15' 00" W. 28° 28' 30" N.	EAT	860	Compania Nacional de T.S.H.	300, 800, 2,540	P G ..	N	France, 0.45	France, 4.50
Valencia ..	0° 22' 45" W. 38° 27' 16" N.	EGG	320	Army ..	600, 1,200 1,600	O ..	N	—	—
Vigo ..	8° 40' 00" W. 42° 15' 00" N.	EAV	430	Compania Nacional de T.S.H.	300, 800, 2,900	P G ..	N	0.45	4.50
(b) Morocco									
Ceuta ..	5° 16' 24" W. 35° 48' 40" N.	EGD	320	Army ..	600, 1,200, 1,500	O ..	N	—	—
Larache ..	6° 12' 00" W. 35° 12' 00" N.	EGF	220	Army ..	600, 900, 1,200	O ..	N	—	—
Meilla ..	2° 56' 25" W. 35° 18' 15" N.	EGB	320	Army ..	600, 1,200, 1,600	O ..	N	—	—
(c) In the Gulf of Guinea. Santa Isabel de Fernando Póo	8° 48' 40" E. 3° 45' 00" N.	EAY	130	Government ..	300, 800, 1,800,	P G ..	Local time: 6 a.m. to 9 a.m., 7 p.m. to 10 p.m.	0.55 ^{1st}	5.50 ^{1st}
SWEDEN									
Gothenburg (Göteborg) ..	11° 53' 46" E. 57° 41' 05" N.	SAB	350	Government ..	300, 800	P G ..	N	0.14	1.40
Härnösand ..	18° 07' 50" E. 62° 44' 12" N.	SAH	350	Government ..	300, 800	P G ..	N	0.14	1.40
Karlskrona ..	15° 35' 30" E. 56° 09' 10" N.	SAA	420	Marine Dept. ..	300, 800	P G ..	N	0.14	1.40
Oscar-Fredriksborg ..	Near Stockholm 18° 26' 42" E. 59° 23' 48" N.	SAD	50	Marine Dept. ..	300, 800	P G ..	—	0.14	1.40
Tingsåde ..	Göthland 18° 35' 30" E. 57° 43' 50" N.	SAE	420	Marine Dept. ..	300, 800	P G ..	—	0.14	1.40
Trälleborg..	13° 09' 45" E. 55° 22' 10" N.	SAC	250	State Railways ..	300, 875, 600	P R ^{1st} O ^{1st}	N	0.14	1.40
Vaxholm ..	18° 22' 36" E. 59° 24' 18" N.	SAF	350	Government ..	300, 800	P G ..	N	0.14	1.40
TUNIS									
Bizerte ..	In Sidi Abdallah 9° 49' 03" E. of Greenwich 7° 29' 03" E. of Paris	FUA	—	French Navy ..	—	O ..	Central European time, ⁵⁶ 9 a.m. to midnight.	—	—

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.	
								Per Word.	Minimum Charge.
UNITED STATES OF AMERICA—contd.									
Boston NAD ³⁴⁵ ..	Meridian of Greenwich, Massachusetts 71° 03' 24" W. 42° 22' 24" N.	NAD	200	U.S. Navy	—	O 150 189 ..	N	Francs. — 233	Francs. — 253
Boston WBF ..	Massachusetts 71° 03' 40" W. 42° 21' 19" N.	WBF	200	Marconi Co.	300, 600	P G ..	N	0.30 156 0.60 189	—
Brooklyn, New York ..	74° 00' 23" W. 40° 39' 23" N.	WCG	500	National Electric Signaling Co.	300, 550, 600, 1,550, 2,000	P G ..	Mean time of the meridian 75° west of Greenwich: 4 a.m. to 8 a.m., 5 p.m. to 9 p.m. X	0.15 227 0.30 188 0.60 189	—
Brownsville, Texas ³⁴⁵ ..	—	WUZ	250	Army ..	1,000	O ..	—	—	—
Buckroe ¹⁷⁶ ³⁴¹ ..	Virginia, Fort Monroe 78° 52' 36" W. 42° 52' 49" N.	WZL WBL	— 185	U.S. Army Marconi Co.	— 300, 500, 600	O .. P G ..	— 233	—	—
Buffalo, New York State ..	Louisiana 80° 22' 45" W. 28° 58' 04" N.	WB W	400	Tropical Radio Tel. Co.	300, 600, 2,200	P G 147 ..	Mean time of the meridian 90° west of Greenwich: 7 a.m. to 7.5 a.m., 9 a.m. to 9.5 a.m., 11 a.m. to 11.5 a.m., 2 p.m. to 2.5 p.m., 4 p.m. to 4.5 p.m., 7 p.m. to 7.5 p.m. ³⁰⁰	0.15	—
Burrwood ..	—	—	—	—	—	—	—	0.60	—
Calumet, Michigan ..	88° 27' 12" W. 47° 15' 12" N.	WCM	150	Marconi Co.	300, 500, 600	P G ..	Mean time of the meridian 90° west of Greenwich: 8 a.m. to 1 p.m., 2 p.m. to 7 p.m., 8 p.m. to 1 a.m., 2 a.m. to 7 a.m. X	0.15	—
Canton, Ohio ..	81° 22' 00" W. 40° 48' 00" N.	WQP	100	Henry L. Ley	500	— 48	N	—	—
Cape Blanco ³⁴⁴ ..	Oregon 124° 33' 30" W. 42° 30' 42" N.	NPF	100	U.S. Navy	600	P G 188 300	N	0.30	—
Cape Cod ³⁴⁵ ..	Massachusetts 70° 03' 54" W. 42° 02' 22" N.	NAE	—	U.S. Navy	—	O ..	N	—	—

Cape May	..	35° 15' 58" N. New Jersey entrance to Delaware Bay	WCY	150	Marconi Co.	..	300, 450, 800	P G	..	..	N	0.30 ¹⁸⁸ 0.60 ¹⁸⁸
Carney's Point	..	74° 55' 46" W. 38° 55' 50" N. New Jersey	WPO	100	E. I. du Pont de Nemours & Co.	..	300, 425 800	—	276	..	X	—
Charleston	South Caro-	75° 27' 00" W. 39° 43' 00" N.	NAO	200	U.S. Navy	..	600	P G	188	..	N	0.30 ²⁸⁸
Chicago	..	79° 57' 42" W. 32° 51' 38" N. Illinois	WGO	150	Marconi Co.	..	300, 450, 800	P G	218	..	Mean time of the meridian 90° west of Greenwich: 1 a.m. to 11 a.m., midday to 5 p.m., midnight to 8 p.m.	0.15
Cleveland, Ohio	..	87° 37' 30" W. 41° 52' 30" N.	WCX	150	Marconi Co.	..	300, 500, 800	P G	..	..	Mean time of the meridian 90° west of Greenwich: 8 a.m. to midday, 12.30 p.m. to 7 p.m., 8 p.m. to 11 p.m., midnight to 7 a.m. ¹⁸⁸	0.15
Colorado Springs	..	81° 41' 13" W. 41° 29' 59" N.	KIY	70	Herbert C. Col- burn	..	300, 425	—	276	..	X	—
Conneaut Harbor	..	Colorado 104° 50' 00" W. 38° 48' 00" N.	WEV	220	Marquette & Bes- smer Dock & Navigation Co.	..	300, 475, 540, 500	P R	218	..	X	0.15
Craftonville	..	Lake Erie 80° 36' 00" W. 41° 57' 00" N.	KJQ	250	Southern Califor- nia Edison Co.	..	1,610	—	276	..	X	—
D.L. & W.R.R. Limited Train	..	California 117° 02' 30" W. 34° 05' 10" N.	WBI	—	Delaware, Lacka- wanna & West- ern Railroad Co.	..	—	—	276	..	—	—
Denver, Colorado	..	105° 00' 00" W. 39° 45' 00" N.	KIX	100	William H. Smith	..	300, 575	—	276	..	X	—
Detroit, Michigan	..	83° 10' 00" W. 42° 20' 00" N.	WOK	300	Goodyear Tire & Rubber Co.	..	300, 600, 2,160	—	276	..	Mean time of the meridian 90° west of Greenwich: 8.30 a.m. to 4.30 p.m.	—
Diamond Shoals Light- ship ²⁸⁸	Light-	Off Cape Hatteras 75° 18' 38" W. 35° 05' 08" N.	NLB	60	U.S. Navy	..	—	O	140 164 168	..	Mean time of the meridian 75° west of Greenwich: 6 a.m. to 10 p.m. ¹⁸⁸	— 223
Douglas, Arizona	..	109° 22' 24" W. 31° 20' 41" N.	KDC	100	Copper Queen Con- solidated Mining Co.	..	800, 1,650	P	..	..	Mean time of the meridian 120° west of Greenwich: 10 a.m. to 11 a.m., 4 p.m. to 5 p.m.	—

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.	
								Per Word.	Minimum Charge.
UNITED STATES OF AMERICA—contd.									
Duluth, Minnesota ..	Meridian of Greenwich, 92° 07' 16" W. 46° 47' 06" N.	WDM	150	Marconi Co. ..	300, 500, 600	P G ⁹⁰ ..	Mean time of the meridian 90° west of Greenwich 1 8 a.m. to midday, 1 p.m. to 7 p.m., 8 p.m. to midnight, 1 a.m. to 7 a.m. N	France, 0.15	—
East San Pedro, California	118° 17' 00" W. 33° 44' 00" N.	KPJ	350	Marconi Co. ..	300, 500, 800	P G ²¹⁵ ..	Mean time of the meridian 120° west of Greenwich 1 8 a.m. to midday, 1 p.m. to 7 p.m., 8 p.m. to midnight, 1 a.m. to 7 a.m. N	0.10 ¹⁹¹ 0.30 ¹⁹⁸ 0.60 ¹⁹⁹	—
Empire, Oregon ..	—	NZV	—	U.S. Army ..	300	O ..	X	—	—
Eureka, California KPM..	124° 11' 00" W. 46° 47' 30" N.	KPM	200	Marconi Co. ..	300, 550, 800	—	Mean time of the meridian 120° west of Greenwich 1 8 a.m. to 6 p.m., 7.30 p.m. to 5 a.m. N	0.30 ¹⁹⁸ 0.60 ¹⁹⁹	—
Eureka California NPW ²¹⁶	Table Bluff 124° 16' 22" W. 46° 41' 44" N.	NPW	200	U.S. Navy ..	600	P G ^{100 100 300} ..	N	0.30	—
Fatalons ²¹⁶ ..	California, to the west of S. Francisco 123° 00' 04" W. 37° 41' 58" N.	NPI	100	U.S. Navy ..	—	O ^{100 308} ..	N	— 253	253
Fire Island ²¹⁶ ..	New York, south coast of Long Island 73° 13' 08" W. 40° 37' 57" N.	NAG	100	U.S. Navy ..	—	O ¹⁰⁰ ..	N	— 253	253
Fire Island Lightship No. 68 ²¹⁶	—	NLS	—	U.S. Navy ..	—	O ..	X	—	—
Fort Adams ²¹⁵ ..	Rhode Island	WUU	125	U.S. Army ..	5,200	O ..	Mean time of the meridian 75° west of Greenwich: 6 a.m. to 10 p.m.	—	—
Fort Andrews ²¹⁶ ..	Massachusetts	WUA	—	U.S. Army ..	—	O ..	X	—	—
Fort Barrancas ²¹⁶ ..	Florida	WZD	125	U.S. Army ..	1,200	O ..	—	—	—
Fort Bliss ..	Texas	WZO	—	U.S. Army ..	—	O ..	X	—	—

Station	Lat.	Long.	Alt.	Time	Remarks	Notes
Fort Constitution ³⁵⁵	33° 55' N.	82° 55' W.	825	..	U.S. Army	..
Fort Crockett ³⁵⁶	33° 55' N.	82° 55' W.	1,200	..	U.S. Army	..
Fort Dade ³⁵⁵	33° 55' N.	82° 55' W.	825	..	U.S. Army	..
Fort Hancock, New Jersey ³⁵⁵	33° 55' N.	82° 55' W.	825	..	U.S. Army	..
Fort H. G. Wright ³⁵⁵	33° 55' N.	82° 55' W.	825	..	U.S. Army	..
Fort Howard ³⁵⁵	33° 55' N.	82° 55' W.	825	..	U.S. Army	..
Fort Huachuca ³⁵⁵	33° 55' N.	82° 55' W.	825	..	U.S. Army	..
Fort Leavenworth WUD ³⁵⁵	33° 55' N.	82° 55' W.	825	..	U.S. Army	..
Fort Leavenworth WUV ³⁵⁵	33° 55' N.	82° 55' W.	825	..	U.S. Army	..
Fort Leavenworth WUE ³⁵⁵	33° 55' N.	82° 55' W.	825	..	U.S. Army	..
Fort Leavenworth WUF ³⁵⁵	33° 55' N.	82° 55' W.	825	..	U.S. Army	..
Fort Monroe WUG ³⁵⁵	33° 55' N.	82° 55' W.	825	..	U.S. Army	..
Fort Monroe WUG ³⁵⁵	33° 55' N.	82° 55' W.	825	..	U.S. Army	..
Fort Morgan, Alabama WFM	33° 55' N.	82° 55' W.	825	..	U.S. Army	..
Fort Morgan, Alabama WUR	33° 55' N.	82° 55' W.	825	..	U.S. Army	..
Fort Morgan, Alabama WUR	33° 55' N.	82° 55' W.	825	..	U.S. Army	..
Fort Moultrie ³⁵⁵	33° 55' N.	82° 55' W.	825	..	U.S. Army	..
Fort Riley, Kansas ³⁵⁵	33° 55' N.	82° 55' W.	825	..	U.S. Army	..
Fort Rosecrans ³⁵⁵	33° 55' N.	82° 55' W.	825	..	U.S. Army	..
Fort Sam Houston ³⁵⁵	33° 55' N.	82° 55' W.	825	..	U.S. Army	..
Fort San Jacinto ³⁵⁵	33° 55' N.	82° 55' W.	825	..	U.S. Army	..
Fort Stevens ³⁵⁵	33° 55' N.	82° 55' W.	825	..	U.S. Army	..
Fort Terry, New York ³⁵⁵	33° 55' N.	82° 55' W.	825	..	U.S. Army	..
Fort Totten ³⁵⁵	33° 55' N.	82° 55' W.	825	..	U.S. Army	..
Fort Whitman ³⁵⁵	33° 55' N.	82° 55' W.	825	..	U.S. Army	..
Fort Winfield Scott ³⁵⁵	33° 55' N.	82° 55' W.	825	..	U.S. Army	..
Fort Wood ³⁵⁵	33° 55' N.	82° 55' W.	825	..	U.S. Army	..
Fort Worden ³⁵⁵	33° 55' N.	82° 55' W.	825	..	U.S. Army	..
Frankfort, Michigan	33° 55' N.	82° 55' W.	825	..	U.S. Army	..
Frying Pan Shoals Lightship ³⁵⁵	33° 55' N.	82° 55' W.	825	..	U.S. Army	..
Galveston	33° 55' N.	82° 55' W.	825	..	U.S. Army	..

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Meters (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.	
								Per Word.	Minimum Charge.
UNITED STATES OF AMERICA—contd.									
Grand Haven	Meridian of Greenwich Michigan 86° 14' 51" W. 43° 03' 17" N.	WGH	100	Marconi Co. ..	300, 500, 800	P G	Mean time of the meridian 90° west of Greenwich: 7 a.m. to 11 a.m., 8 p.m. to 11 p.m.	Francs. 0.15	—
Grand Marais	Minnesota 90° 20' 00" W. 47° 45' 00" N.	WGM	120	Marconi Co. ..	300, 800	P G 120 ..	—	0.15	—
Great Falls, Montana ..	111° 10' 00" W. 47° 35' 00" N.	KLQ	—	Great Falls Power Co.	1,700	— 270	X	—	—
Great Lakes 240 242	Illinois 87° 58' 00" W. 42° 18' 30" N.	NAJ	800	U.S. Navy ..	100, 800, 1,000	P G 240 242	N	0.30	—
Heald Bank Lightship 246	Off Galveston (Texas) 94° 13' 00" W. 29° 06' 00" N.	NLP	60	U.S. Navy ..	300, 600	O	Mean time of the meridian 90° west of Greenwich: 8 a.m. to 10 p.m.	—	—
Hillcrest, Daly City ..	California 122° 30' 00" W. 37° 48' 00" N.	KPH	200	Marconi Co. ..	300, 800	P G	N	0.30 150 0.60 150	—
Hoboken, New Jersey ..	40° 43' 00" N. 74° 02' 00" W.	WBU	400	Marconi Co. ..	2,240	— 150	X	—	—
Hollister, California ..	121° 24' 00" W. 36° 55' 43" N.	KGH	200	Palmer B. Hewlett	300, 800, 1,650	— 241	X	—	—
Independence, Kansas ..	95° 44' 00" W. 37° 14' 00" N.	WQL	150	Kansas Gas & Electric Co.	1,700	P 244 ..	X	—	—
Indianhead, Maryland 246	77° 10' 55" W. 38° 38' 00" N.	NBG	—	U.S. Navy ..	300, 600, 750	O	— 244	—	—
Inglewood, California ..	118° 10' 48" W. 33° 58' 04" N.	KFZ	500	Federal Telegraph Co.	300, 800, 3,300, 4,000	— 151	Mean time of the meridian 120° west of Greenwich: 9 a.m. to 6 p.m.	—	—
Jacksonville, Florida ..	Mouth of St. John's River 81° 38' 56" W. 30° 10' 25" N.	WJX	200	Marconi Co. ..	300, 450, 800	P G	Mean time of the meridian 90° west of Greenwich: 6 a.m. to 8 a.m., 10 a.m. to 1 p.m., 4 p.m. to 7 p.m.	0.30	—

Key West, Florida ²⁵⁴	..	26° 56' 52" N. 81° 48' 26" W. 24° 33' 28" N.	400	U.S. Navy	..	600	P G ^{140 152 205} ..	N	0.30	—
Lents	..	Oregon 122° 35' 00" W. 45° 23' 00" N.	—	Federal Telegraph Co.	—	—	—	—	—	—
Lewistown	..	Montana 118° 15' 00" W. 34° 04' 00" N.	150 1,000	Montana Power Co. Federal Telegraph Co.	..	300, 600, 1,600 300, 800, 1,800, 2,800, 3,250	P G ²⁹³ — ²⁷⁶	Mean time of the meridian 120° west of Greenwich: 4 a.m. to 10 p.m. X	0.30 ¹⁵⁸ 0.60 ¹⁵⁹	—
Ludington, Michigan	..	86° 26' 19" W. 43° 56' 47" N.	125	Marconi Co.	..	300, 500, 800	P-G ..	Mean time of the meridian 90° west of Greenwich: 7 a.m. to 11 a.m., midday to 6 p.m., 8 p.m. to 1 a.m., 2 a.m. to 7 a.m. ²¹¹ — ²¹²	0.15	—
Mackinac Island	..	Michigan 84° 37' 00" W. 45° 50' 00" N.	150	Marconi Co.	..	300, 500, 800	P G ..	Mean time of the meridian 90° west of Greenwich: 8 a.m. to 11 a.m., 2 p.m. to 5 p.m., 7 p.m. to 9 p.m. Mean time of the meridian 90° west of Greenwich: 8 a.m. to 11.30 a.m., 2.30 p.m. to 6 p.m., 7.30 p.m. to 8.30 p.m. ²¹⁶	0.15	—
Manistique	..	Michigan 86° 15' 36" W. 45° 57' 36" N.	125	Marconi Co.	..	300, 500, 800	P G ²¹³	—	0.15	—
Manitowoc	..	Wisconsin 87° 39' 17" W. 44° 05' 18" N.	125	Marconi Co.	..	300, 500, 800	P G ²¹³	—	0.15	—
Marshfield, Oregon	..	124° 12' 50" W. 43° 22' 26" N.	150	Marconi Co.	..	300, 600	P G ..	N	0.30 ¹⁵⁸ 0.60 ¹⁵⁹	—
Miami, Florida	..	South-east Coast of Florida 80° 07' 15" W. 25° 48' 21" N.	300	Marconi Co.	..	300, 450, 800	P G ²¹⁵	—	0.30	—
Milwaukee	..	Wisconsin 87° 55' 25" W. 43° 02' 50" N.	150	Marconi Co.	..	300, 500, 800	P G ..	Mean time of the meridian 90° west of Greenwich: 8 a.m. to midday, 1 p.m. to 5 p.m., 6 p.m. to 8 a.m. ²²⁴	0.15	—
Mobile, Alabama	..	88° 02' 27" W. 30° 41' 34" N.	200	Marconi Co.	..	300, 535, 800	P G ²¹⁵	X	0.30	—
Mount Vernon, Ohio	..	82° 31' 00" W. 40° 24' 00" N.	80-90	Bunyan J. Hyatt	..	500	— ²¹⁷	—	—	—

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.	
								Per Word.	Minimum Charge.
UNITED STATES OF AMERICA—contd.									
Nantucket Shoals Light-ship ²⁵⁵	Meridian of Greenwich To the east of New- port, R. I., south end of shoals 69° 36' 33" W. 40° 37' 05" N. 72° 05' 40" W. 41° 22' 40" N. 72° 05' 25" W. 41° 19' 00" N.	NLA	50	U.S. Navy	—	O 140 140 178 ..	Mean time of the meridian 75° west of Greenwich; 4 a.m. to midnight. ¹⁴⁴	— 255 Francs. — 255	— 255 Francs. — 255
New London, Connecticut NRZ ²⁷¹		NRZ	100	U.S. Coast Guard Service	300, 600	O 251 ..	X	—	—
New London, Connecticut WLC		WLC	100	T. A. Scott Co. Incorp.	300, 510, 600, 1,510, 1,700, 1,800, 1,900, 2,000	P G ..	Mean time of the meridian 75° west of Greenwich; 8 p.m. to 4 a.m. Mean time of the meridian 90° west of Greenwich; 8 a.m. to 10 p.m. ¹⁸⁸	0.15 227 0.30 188 0.60 159	—
New Orleans NAT ²⁵⁵	Louisiana, Algiers, 90° 02' 18" W. 29° 56' 50" N. Louisiana 90° 07' 00" W. 29° 59' 00" N.	NAT	100	U.S. Navy	—	O 140 141 272 ..	Mean time of the meridian 90° west of Greenwich; 8 a.m. to 10 p.m. ¹⁸⁸	— 141 255 — 141 255	141 255
New Orleans WHK		WHK	200	Marconi Co.	300, 600	P G ..	— 228	0.30	—
New Orleans WNU	Louisiana 90° 06' 20" W. 30° 00' 20" N. 71° 19' 44" W. 41° 29' 17" N. 71° 18' 58" W. 41° 29' 15" N.	WNU	400	Tropical Radio Telegraph Co.	300, 600, 2,200	P G 228 ..	N	0.60	—
Newport, Rhode Island NAF ²⁵⁵		NAF	200	U.S. Navy	—	O 140 150 ..	N	— 255	— 255
Newport, Rhode Island, WCI		WCI	100	National Electric Signalling Co.	300, 550, 600	P G ..	Mean time of the meridian 75° west of Greenwich; 7 p.m. to 6 a.m. X	0.15 256 0.30 227 0.60 158	—
New Prague	Minnesota, 93° 31' 12" W. 44° 32' 39" N.	WPU	300	New Prague Flour- ing Mill Co. (In- ternational Mil- ling Co.)	500	— 276		—	—
New York NAH ²⁵⁵	Brooklyn 73° 58' 51" W. 40° 41' 58" N. 74° 00' 50" W. 40° 42' 02" N.	NAH	150	U.S. Navy	—	O 140 180 ..	N	— 255	— 255
New York WHB		WHB	300	New York Herald Co.	400, 600, 1,510	P G 178 ..	N	0.30 156 0.60 159	—
New York WHI	73° 59' 31" W. 40° 43' 50" N.	WHI	—	Marconi Co.	300, 600	P G ..	N	0.30 156 0.60 159	—

Norfolk, Virginia	76° 17' 41" W. 36° 49' 39" N.	NAM	200	U.S. Navy	..	O 180 189 .. — 353 — 183
North Head	Washington, Estuary of Columbia River	NPE	400	U.S. Navy	..	P G 160 272 803 .. 0.30 —
Oakland, California	124° 04' 34" W. 46° 17' 42" N.	KGI	150	Ellery W. Stone	..	P .. X —
Pensacola, Florida	122° 16' 14" W. 37° 48' 41" N.	NAS	100	U.S. Navy	..	P G 148 .. N 0.30 258 —
Philadelphia NAI	Gulf of Mexico 87° 16' 15" W. 30° 20' 54" N.	NAI	150	U.S. Navy	..	O 160 .. N — 85 — 183
Philadelphia WHE	Pennsylvania 75° 10' 46" W. 39° 53' 18" N.	WHE	100	Marconi Co.	..	P G .. Mean time of the meridians 75° west of Greenwich : 9 a.m. to 5 p.m.
Philadelphia WHE	Pennsylvania 75° 09' 44" W. 39° 57' 06" N.	WHE	400	J. Wanamaker	..	— 187 Local time at 6 a.m. to 6 p.m. N
Phoenix, Arizona	112° 05' 39" W. 33° 26' 39" N.	KHQ	300	Federal Telegraph Co.	..	P G 180 274 803 .. 0.30 158 0.60 158 —
Point Arguello	California 120° 38' 48" W. 34° 34' 35" N.	NPK	100	U.S. Navy	..	PG 180 274 803 .. 0.30 —
Port Isabel	Texas 93° 55' 35" W. 29° 52' 46" N.	NAY WRU	200	Naval Marconi Co.	..	PG PG .. Mean time of the meridians 90° west of Greenwich; 6.30 a.m. to midday, 12.30 p.m. to 6 p.m., 6.30 p.m. to 8.30 p.m.
Portland, Maine	70° 12' 03" W. 43° 33' 42" N.	NAB	100	U.S. Navy	..	O 160 181 .. Mean time of the meridians 75° west of Greenwich : 8 a.m. to 10 p.m. X
Portland, Maine WXV	---	WXV	30	National Guard State of Maine Charles L. Austin	..	O .. X — 128 —
Portland, Oregon KDP	122° 42' 30" W. 45° 30' 45" N.	KDP	150	Charles L. Austin	..	X — 28 —
Portland, Oregon KGN	122° 41' 00" W. 45° 32' 00" N.	KGN	150	North Western Electric Co.	..	X —
Port Royal, South Carolina	80° 41' 00" W. 32° 22' 00" N.	NAV	---	U.S. Navy	..	O .. N —

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.	
								Per Word.	Minimum Charge.
UNITED STATES OF AMERICA—contd.									
Portsmouth, New Hampshire ²⁴⁸	Meridian of Greenwich. 70° 44' 00" W. 43° 04' 33" N.	NAC	150	U.S. Navy	—	O ¹⁴⁰	N	— ²⁵³	Francs. — ²⁵³
Providence, Rhode Island	71° 25' 00" W. 41° 49' 00" N.	WPF	100	Dutree W. Flint ..	300, 450, 600	P ²⁵⁸	X	—	—
Puget Sound ²⁵⁰ ..	Washington 122° 38' 10" W. 47° 33' 47" N.	NPC	200	U.S. Navy	—	O	N	— ²⁵³	— ²⁵³
Rialto, California..	117° 26' 53" W. 34° 12' 08" N.	KJR	250	Southern California Edison Co.	300, 600, 1,610	P R ¹⁸⁸	X	—	—
Rive- Rouge ..	Michigan 83° 07' 15" W. 42° 15' 17" N.	WDR	150	Marconi Co. ..	300, 500, 600	P G	Mean time of the meridian 90° west of Greenwich: 7 a.m. to 11.30 a.m. 12.30 p.m. to 6 p.m. 7 p.m. to 11 p.m., midnight to 6 a.m. ¹⁸⁸	0.15	—
Sagaponack ..	New York 72° 17' 02" W. 40° 54' 44" N.	WSK	100	Marconi Co. ..	300, 600	P G	X	0.30 ¹⁵⁸ 0.60 ¹⁵⁹	—
St. Augustine, Florida ²⁴⁹	North-east coast of Florida 81° 17' 05" W. 29° 53' 20" N.	NAP	100	U.S. Navy	600	P G ¹⁸⁸	N	0.30 ²⁵³	—
San Diego, California KSD	117° 09' 37" W. 32° 41' 30" N.	KSD	500	Federal Telegraph Co.	300, 600, 1,800, 2,800	P G ²⁵⁸	Mean time of the meridian 120° west of Greenwich: 4 a.m. to 8 p.m. N	0.30 ¹⁵⁸ 0.60 ¹⁵⁹	—
San Diego, California NPL ²⁵⁰	117° 15' 00" W. 32° 42' 26" N.	NPL	200	U.S. Navy	— 600	P G ¹⁸⁸ 304 308 ..	N	0.30	—
San Francisco KFS ..	California 122° 30' 06" W. 37° 49' 36" N.	KFS	750	Federal Telegraph Co.	300, 600, 1,800, 3,000, 3,500	P G ²⁵⁸	Mean time of the meridian 120° west of Greenwich: 7	0.30 ¹⁵⁸ 0.60 ¹⁵⁹	—

San Francisco NPH	NPH	200	U.S. Navy	—	O 180 180 200	N	— 215
California 122° 15' 56" W. 38° 05' 03" N.	WSV	200	Marconi Co.	300, 450, 800	P G	Mean time of the meridian 90° west of Greenwich : 6 a.m. to midnight.	—
Georgia 81° 06' 15" W. 32° 05' 15" N.	WSL	4,500	Atlantic Commu- nication Co.	3,900, 4,700, 5,200 6,300, 7,800, 9,400	— 180	Mean time of the meridian 75° west of Greenwich : 2 a.m. to 2 p.m.	—
New York, Long Island 73° 06' 12" W. 40° 14' 46" N.	WTP	—	Delaware, Lacka- wanna & West- ern Railroad Co.	—	— 288	—	—
Scranton, Pennsylvania..	WSE	200	Marconi Co.	300, 800	P G	N	—
Sea Gate ..	KPA	150	Marconi Co.	300, 500, 800 1,650 2,987	P G 218	N	—
Seattle KPA ..	KPE	100	City of Seattle Harbor Dept.	300, 575, 800	P G	Mean time of the meridian 120° west of Greenwich : 8 a.m. to midday, 1 p.m. to 5 p.m., except Sundays and holidays.	—
Seattle KPE ..	WSC	165	Marconi Co.	300, 800	P G	N	—
Siasconset..	KSS	2,500	Federal Telegraph Co.	100, 800, 1,800, 5,000, 8,000, 10,000	P G 291	N	—
South San Francisco	WCC	600	Marconi Co.	300, 800, 2,100 101	P G	X	—
South Wellfleet	WPD	200	Marconi Co.	300, 510, 800	P G	Mean time of the meridian 90° west of Greenwich : 6 a.m. to 8 a.m., 10 a.m. to 1 p.m., 4 p.m. to 7 p.m.	—
Tampa, Florida ..	NPD	100	U.S. Navy	600	P G 288	—	—
Tatoosh 116							—

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.	
								Per Word.	Minimum Charge.
UNITED STATES OF AMERICA—contd.									
Tuckerton, New Jersey ..	Meridian of Greenwich. 74° 20' 00" W. 39° 34' 45" N.	WGG	4,000	— ²⁴	8,600	— 179	N	—	—
Underwood, Washington	121° 32' 00" W. 45° 45' 00" N.	KGO	75	Northwestern Electric Co.	300, 600, 1,700	—	X	—	—
Victor, Colorado ..	103° 07' 00" W. 38° 46' 00" N.	KIW	160	Ajax Gold Mining Co.	575	— 270	Mean time of the meridian 105° west of Greenwich: 9 a.m. to 11.30 a.m., 7.30 p.m. to 11 p.m.	—	—
Virginia Beach ..	Virginia, entrance to Chesapeake Bay 75° 58' 58" W. 36° 50' 36" N.	WSY	200	Marconi Co. ..	300, 550, 600	P G 125 ..	N	0.30	—
Washington NAA ²⁸⁸ ..	Virginia, near Washington, D.C. 77° 04' 47.20" W. 38° 52' 05.20" N.	NAA	1,000	U.S. Navy ..	—	O 127 160 168 220	N	— 253	— 253
Washington NAL ^{284 287} ..	District of Columbia 77° 00' 11" W. 38° 52' 21" N.	NAL	150	U.S. Navy ..	—	O 160 ..	N	— 253	— 253
Washington NZW ..	District of Columbia 77° 00' 32" W. 38° 53' 12" N.	NZW	500	Supt., U.S. Capitol Building and Grounds	250, 650, 1,000	O ..	X	—	—
Washington WUP ¹⁸⁴ ..	District of Columbia 93° 45' 00" W. 43° 45' 00" N.	WUP	—	U.S. Army ..	—	O ..	—	—	—
Washington WUQ ¹⁸⁸ ..	District of Columbia 92° 20' 00" W. 37° 42' 00" N.	WUQ	—	U.S. Bureau of Standards	—	O ..	—	—	—
Wells, Minnesota ..	93° 45' 00" W. 43° 45' 00" N.	WPT	150	Wells Flour Mill Co.	500	P 170 ..	X	—	—
Wichita, Kansas ..	92° 20' 00" W. 37° 42' 00" N.	WQM	200	Kansas Gas & Electric Co.	1,700	P 205 ..	X	—	—
Wilmington, Delaware ..	75° 32' 52" W. 38° 44' 16" N.	WPP	500	E. I. du Pont de Nemours & Co.	300 425, 600	— 276	X	—	—

NOTES

Land Stations

1. Meteorological forecasts are transmitted free of charge by coast stations to vessels at the following hours (Melbourne time):—Adelaide Radio, 7 p.m. and 8.30 p.m.; Melbourne Radio, 7.30 p.m. and 9 p.m.; Sydney Radio, 8 p.m. and 9.30 p.m.; Hobart Radio, 10 p.m.; Brisbane Radio, 10.30 p.m. and 11 p.m.

2. The station transmits time signals (standard convention symbols) at noon and midnight, Melbourne time (10 hours in advance of Greenwich time).

3. In the case of radiotelegrams originating at or intended for the place (or places) named against the letter in reference, the charge for transmission between such place and the coast station concerned is included in the coast charge:—

- | | |
|---|--|
| (a) Macquarie Island. | (l) Flinders Island. |
| (b) Port Moresby. | (m) Florianopolis (Desterro, Santa Catharina). |
| (c) Bahia (San Salvador). | (n) Canton or Shameen |
| (d) Rio de Janeiro. | (o) Foochow. |
| (e) Campos or Rio de Janeiro. | (p) Shanghai or Woosung (Kiangsu). |
| (f) Fernando de Noronha or Recife (Pernambuco). | (q) Port Sudan. |
| (g) Pelotas or Rio Grande do Sul. | (r) Casablanca, Maroc. |
| (h) Santos. | (s) Mogador. |
| (i) Olinda or Recife (Pernambuco). | (t) Tanger. |
| (j) Nassau. | (u) Falkland Islands. |
| (k) Port of Spain (Trinidad) or Scarborough (Tobago). | |

4. Mean time of the meridian of Cordoba, 4 hours 16 minutes 48.22 seconds later than Greenwich time.

5. The hours are extended on the dates of arrival and departure of the regular steamers of the Compagnie Belge Maritime du Congo.

6. The station is open for public correspondence in the inland service.

7. The station also communicates by radiotelegraphy with Loango.

8. For correspondence with the Belgian Government steamers on the voyage between Dover and Ostend, no special coast charge. The total wireless charge is fixed at fr. 1.50 per radiotelegram of 10 words or less, with fr. 0.10 additional for each word over ten.

9. For long range communication.

10. The station is limited to correspondence with coast and ship stations of the North Alaska Salmon Company.

11. The station transmits each night, on the wave-length of 4,000 metres, except Sunday, the mean time of Central Japan. For full particulars see International Time and Weather Signals—Japan.

12. The station also communicates with Ketchikan.

13. Under construction.

14. The long wave-lengths are used for correspondence with Astoria (Oregon, United States).

15. The station also communicates with Astoria, Oregon (United States), and with Juneau and Port Walter, Alaska.
16. The handling of public correspondence has been suspended.
17. For official correspondence.
18. The station also exchanges ordinary telegrams with the peninsula of Yucatan.
19. The station also corresponds with a station at Virginia Beach (Virginia) when the Weather Bureau's wire is out of order.
20. The station also exchanges public and official correspondence with Trinidad.
21. Correspondence with Heald Bank Lightship.
22. The station also exchanges correspondence of private interest with other fixed stations.
23. During the day-time the station is largely occupied with inland communication.
24. Information regarding weather is distributed twice daily from the station at 1 p.m. and 1 a.m. (Indian standard time—see Note 27).
25. Information regarding weather is distributed twice daily from the station at 1.10 p.m. and 1.10 a.m. (Indian standard time—see Note 27).
26. In advance of Greenwich time by 3 hours 51 minutes.
27. Time of British India, 5 hours 30 minutes in advance of Greenwich time.
28. The station also exchanges public and official correspondence with Berbera Radio.
29. The station also exchanges public and official correspondence with Aden Radio.
30. In the case of radiotelegrams neither originating at nor intended for Berbera itself, the coast charge is included in the charge of fr. 0.625 for transmission between Aden and Berbera.
31. Jamaica standard time, 5 hours later than Greenwich time.
32. The station also communicates by radiotelegraphy with Miami, Florida.
33. The charges applicable to the transmission of radiotelegrams to places other than Port of Spain, Trinidad, or Scarborough, Tobago will be notified to ship stations by the coast station. See Note 3 (k).
34. The station also exchanges public and official correspondence with Tobago.
35. Accounts should be rendered to the Marconi Wireless Telegraph Company of Canada, Montreal.
36. The station is temporarily operated by the United States Naval Communication Service, Radio, Virginia.
37. Cape Sable and Sable Island communicate with the land telegraphic system through Camperdown, Nova Scotia. Radiotelegrams exchanged between Cape Sable or Sable Island and Camperdown, Nova Scotia, are subject to a retransmission charge of fr. 0.30 per word. This charge is additional to the ordinary radio and land telegraph rates, and should be credited to the Marconi Wireless Telegraph Company of Canada, Montreal.

38. The station is limited to correspondence with Underwood (Washington State).

39. For radiotelegrams sent by or addressed to the commander of a ship and relating to the service of the ship the coast charge is *fc.* 0.25 per word. The preamble of such radiotelegrams should contain the service instruction S B.

40. For radiotelegrams sent from or addressed to ships engaged in the local service between Victoria, Vancouver and Seattle, the coast charge is *fr.* 0.15 per word. The preamble of such radiotelegrams should contain the service instruction F B.

41. Accounts should be rendered to the District Superintendent, B. C. Division, Government Radiotelegraph Service, Victoria, B.C.

42. The station is open only during the season of navigation, approximately April to December.

43. The station communicates only with ships of the Graham and Morton Transportation Company.

44. Pacific standard time, 8 hours later than Greenwich time.

45. Atlantic standard time, 4 hours later than Greenwich time.

46. The station receives weather forecasts from the Canadian Meteorological Service at 10 p.m. These advices will be transmitted free to any ship station on request. In addition, the station transmits, without coast charge, radiotelegrams of the following kinds:—

1. Any message concerning the navigation of a vessel sent by the captain of the vessel and intended for any department of the Government, any officer of the Government, or the officer in charge of the coast station.

2. Messages exchanged between the captain of any vessel and any person whatsoever concerning the state of the weather, the condition of the tide or ice, or reports on aids to navigation.

47. The station is temporarily operated by the United States Naval Communication Service, Radio, Virginia. Accounts should be rendered to the Atlantic Communication Company, 47, West Street, New York.

48. The station is limited to correspondence with Mount Vernon, Ohio.

49. Five hours later than Greenwich time.

50. The station belongs to the Marconi International Marine Communication Company, London, and the Eastern Extension Australasia and China Telegraph Company, London; it is operated and controlled by the latter company.

51. The station exchanges public correspondence with Curaçao.

52. The station also exchanges public correspondence with Aruba and Bonaire.

53. Radiotelegraphic communication with ships at sea only in case of distress.

54. General public correspondence may be admitted if the station is not engaged with official correspondence.

55. Meteorological reports and navigation notices are transmitted twice daily at 11 a.m. and 11 p.m. (Greenwich mean time). For full particulars see International Time and Weather Signals, under French Oceania—Tahiti.

56. Central European time, one hour in advance of Greenwich time.

57. The station accepts only messages received from Mogadiscio I S G.

58. The station also communicates by radiotelegraphy with the other stations in the Fiji Islands. The charge for the transmission of radiotelegrams between two coast stations in the Fiji Islands is fr. 0.30 per word. In addition, the station exchanges meteorological telegrams with ships in stormy weather.

59. Eastern European time, two hours in advance of Greenwich time.

60. The working hours between Monday and Friday are divided into three sections, starting respectively at 10 a.m., noon, and 3 p.m. The stations continue working until the completion of the messages in hand and then close down. There are only two working-hour sections on Saturday, starting respectively at 10 a.m. and noon, and the same conditions with regard to working apply as on other week days.

61. The coast charge is reduced to fr. 0.15 per word for correspondence with ships engaged in a regular service between France on the one hand and Corsica, Algeria and Tunis on the other.

62. The coast charge is reduced to fr. 0.15 per word for correspondence with ships whose home ports are on the coast of the English Channel and the Straits of Dover, and which are engaged in a regular service between France and England.

63. Experimental station, also open for distress calls.

64. The station belongs to the State Railway Administration, and is used in connection with the business of the ships employed on the service between Dieppe and Newhaven.

65. The station also communicates by radiotelegraphy with Boma.

66. Continuous service during the voyages of the regular steamers.

67. Meteorological telegrams are transmitted at 9.30 a.m.

68. All radiotelegrams sent through this station are subject to the censorship of the Military Commandant of the island, and messages must be worded in plain language—English, French, Italian, Portuguese, or Spanish.

69. The station only corresponds with other Japanese stations.

70. The station connects with the inland telegraph system through the Rufisque station. The charge applicable to transmission in either direction between Port-Etienne and Rufisque is fr. 0.30 per word.

71. The station is open primarily for official correspondence. Public correspondence is only admitted in special cases, when a coast station tax of fr. 0.60 per word, minimum charge fr. 6.00, will be applied.

72. The station exchanges radiotelegrams with Port-Etienne and Conakry and only communicates with ships as substitute for Dakar.

73. The working of the station is temporarily suspended.

74. For telegrams of which the only wireless transmission takes place between the lightship and the shore, a fixed charge of fr. 1.00 per telegram only is collected, in addition to the ordinary charges for transmission over the land lines.

75. Public correspondence restricted to urgent messages relating to navigation.

76. The station communicates only with the ships of the Norddeutscher Lloyd Company and only as regards the reception of radio-telegrams.

77. Storm-warnings directed to the German Baltic coast are transmitted three times on the wave-length of 450 metres, as soon as the station has the information. They are repeated once at 1 p.m. and 11 p.m. (Central European time—one hour in advance of Greenwich time). For other warnings of storms, see Cuxhaven and Norddeich.

78. When the working of the Norddeich station is interrupted, storm-warnings are transmitted three times, as required, on the wave-length of 1,650 metres, as soon as the station has the information. They are repeated once at 1 p.m. and 11 p.m. (Central European time—one hour in advance of Greenwich time). Storm-warnings directed only to the German Baltic coast are sent out by the Bülk station.

79. The station is prepared to receive calls chiefly during the first 15 minutes of each of its hours of service.

80. The station communicates only with fishing and coasting vessels.

81. The station transmits on the wave-length of 1,650 metres:

a. Time-signals: noon and midnight (Greenwich mean time).

For full particulars see International Time and Weather Signals—Germany.

b. Notices of importance intended for navigators (displacement of lights, etc.) transmitted as required, and repeated three times, as soon as received. These messages are repeated three times immediately after the time-signals, at noon and midnight (Greenwich mean time).

c. Meteorological telegrams, daily at 1 p.m. (Central European time—one hour in advance of Greenwich time).

d. Storm-warnings intended for the German North Sea coast, transmitted as required, and repeated three times, as soon as received. These warnings are repeated once at 1 p.m. or 11 p.m. (Central European time—one hour in advance of Greenwich time). When the working of the Norddeich station is interrupted, the storm-warnings are sent out in the same manner by the Cuxhaven station. Storm-warnings intended only for the German Baltic coast are sent out from Bülk.

82. Official correspondence with Trällebörg and with the ferry-boats of the Sassnitz-Trällebörg line, concerning the railway traffic.

83. Public correspondence with the ferry-boats of the Sassnitz-Trällebörg line.

84. The station is prepared to receive calls chiefly during the first fifteen minutes of the second half of each of its hours of service.

85. This station also exchanges public correspondence with Juneau and Sitka.

86. This station also exchanges public correspondence with Kawaihae, Lahaina and Lihue (Hawaiian Islands), Tutuila and Apia (Samoa Islands).

87. This station also exchanges public correspondence with Koko Head KIE (Hawaiian Islands).

88. At the request of ships, and on payment of the charges, transmission of meteorological reports (not more than twenty words), giving the following information :

a. A general summary of the atmospheric conditions of the morning of the day of transmission of the report;

b. A forecast of the weather—strength and direction of the wind—applicable to the German North Sea coast for the day (midnight to midnight) following the transmission of the forecast;

c. A storm-warning, if required.

Charge per word : fr. 0.18, without minimum.

89. At the request of ships, and on payment of the charges, transmission of meteorological reports (not more than twenty words), giving the following information :

a. A general summary of the atmospheric conditions of the morning of the day of transmission of the report;

b. A forecast of the weather—strength and direction of the wind—applicable to the west part of the German Baltic coast for the day (midnight to midnight) following the transmission of the forecast;

c. A storm-warning, if required.

Charge per word : fr. 0.18, without minimum.

90. At the request of ships, and on payment of the charges, transmission of meteorological reports (not more than twenty words), giving the following information :

a. A general summary of the atmospheric conditions of the morning of the day of transmission of the report;

b. A forecast of the weather—strength and direction of the wind—applicable to the east part of the German Baltic coast for the day (midnight to midnight) following the transmission of the forecast.

c. A storm-warning, if required.

Charge per word : fr. 0.18, without minimum.

91. Special correspondence, including official and ordinary telegrams exchanged with Rathlin Island.

92. For radiotelegrams exchanged with all ships except those making regular voyages not exceeding 1,000 miles to or from a port in the United Kingdom. In the case of radiotelegrams originating in or destined for the United Kingdom, the charge is fr. 0.67 per word, including the coast charge and the charge for transmission over the telegraph lines of the United Kingdom.

93. For radiotelegrams exchanged with ships making regular voyages of more than 200 miles but not more than 1,000 miles to or from a port in the United Kingdom. In the case of radiotelegrams originating in or destined for the United Kingdom the charge is fr. 0.37 per word, with a minimum of fr. 2.22 per radiotelegram, including the coast charge and the charge for transmission over the telegraph lines of the United Kingdom.

94. For radiotelegrams exchanged with ships making regular voyages of 200 miles or less to or from a port in the United Kingdom,

In the case of radiotelegrams originating in or destined for the United Kingdom the charge is fr. 0.20 per word, with a minimum of fr. 2.00 per radiotelegram, including the coast charge and the charge for transmission over the telegraph lines of the United Kingdom.

95. A fixed charge of fr. 1.00 per radiotelegram is made, in addition to the ordinary telegraph charges.

96. The station also communicates with Grand Marais (United States).

97. Special correspondence, including official and ordinary telegrams exchanged with Tobermory.

98. Special correspondence with the Dieppe coast station.

99. The wave length of 600 metres is used solely for communication with Scheveningen-Port. Such communication takes place only in case of urgent need.

100. Special correspondence, including official and ordinary telegrams exchanged with Ballycastle, Antrim.

101. For correspondence exchanged with the steam ferries *Hermosa* and *Cabrillo*. Address and signature free of charge.

102. Special correspondence, including official and ordinary telegrams exchanged with Lochboisdale.

103. Correspondence restricted to messages exchanged with the steamers of the South Eastern and Chatham Railway Company.

104. Correspondence restricted to the transmission of radiotelegrams to ships at sea when they are out of range of any other British station.

105. The station is intended for: (a) the transmission to the Scheveningen-Port coast station of telegrams received by means of flag signals from ships passing within sight, or the retransmission by means of these signals, to such ships, of telegrams sent to it through the Scheveningen-Port coast station; (b) meteorological services.

106. Telegrams originating on or intended for ships and forwarded through Scheveningen-Port are subject to the coast charge of Scheveningen-Port, the charge for transmission over the inland telegraph lines, and a fixed charge of fr. 1.00 per telegram.

107. The station transmits on a wave length of 1,800 metres two messages, one at 11.15 a.m., the other at 11.15 p.m. (Greenwich time), which are made up as follows:—

(a) Daily, except on Sundays and holidays, a meteorological telegram preceded by the letters K.N.M.I.

(For further particulars see International Time and Weather Signals—Holland.)

(b) The storm signal, when there is one, in Dutch and English.

As the station does not send out the meteorological telegram on Sundays and holidays, the storm signal, when there is one, is on those days preceded by the letters K.N.M.I.

(c) Advice to navigators (alterations of lighthouses, lightships, and lightbuoys, the presence of derelicts, and the disappearance or displacement of lightships, lightbuoys, or important buoys) sent out in Dutch as well as English; the advice in Dutch will be preceded by the letters N.B.A.Z.

If there is no advice to navigators, the message will consist only of the meteorological telegram preceded by the letters K.N.M.I., completed where necessary by the storm signal.

If there is no storm signal, but only an advice to navigators, the latter will be preceded by the letters N.B.A.Z. On Sundays and holidays, if there is no signal of either kind, no message will be sent out.

The messages will be transmitted three times in succession. The first time they will be transmitted quickly, and the second and third times slowly.

On request, the messages or a part of them will be transmitted to ships by means of the normal wave length at other times, in return for a charge which may not exceed that for a radiotelegram of 20 words, and which will be debited to the ships.

108. The charge applicable to the transmission of radiotelegrams between the stations of Italian Somaliland is fixed at fr. 2.52 per radiotelegram of ten words or less, with fr. 0.25.20 additional for each word over ten.

109. Exclusively for the service of the steam ferry-boats of the Strait of Messina.

110. The station also transmits messages to the coast station Massaua. Charge per word: fr. 0.60 for private telegrams; fr. 0.30 for press telegrams.

111. The station transmits each day a time signal for the use of shipping in South African waters. For full particulars see International Time and Weather Signals—South Africa.

112. This station also exchanges public correspondence with Latouche (Alaska).

113. The station transmits on the wave length of 600 metres each night, except Sunday, the mean time of Central Japan (time of the meridian 135° E.). For full particulars see International Time and Weather Signals—Japan.

114. This charge includes the charge applicable to the transmission over the lines of the Japanese telegraph service of radiotelegrams originating in or intended for the Empire of Japan and Southern Manchuria; but for urgent radiotelegrams there is an additional charge of fr. 0.25 per word.

115. The station also communicates by radiotelegraphy with Dzaoudzi. In case of interruption of the inland telegraph lines, the Diégo-Suarez and Majunga stations exchange by radiotelegraphy the inland and international correspondence.

116. The station also communicates by radiotelegraphy with Majunga.

117. Rate applicable to radiotelegrams to or from vessels trading to ports outside Australasia.

118. The station also exchanges ordinary telegrams originating in or intended for Lower California.

119. The station also exchanges ordinary telegrams originating in or intended for the peninsula of Yucatan.

120. The station transmits the time of the meridian of Tacubaya (see Note 121) daily at noon in the following manner:

From 11.55 a.m. to noon; repeated transmission of the inquiry signal "CQ"; then repeated transmission of the signal "XH" (time of Tacubaya);

At noon: transmission of the word "noon," always followed by a free announcement of the state of the weather.

On request, this announcement will also be transmitted to ships at other times, in return for a charge which must not exceed that for a radiotelegram of twenty words and which will be debited to the ships.

During the transmission of the time-signals and of the meteorological announcement at noon, all other transmission will be stopped, except distress calls. Special warnings necessitated by sudden changes in the state of the atmosphere, by accidents at sea, and by the derangement or displacement of signs intended as aids to navigation (buoys, sea-marks, etc.), will also be transmitted free.

121. Mean time of the meridian of Tacubaya: six hours 36 minutes 46.67 seconds later than Greenwich time.

122. Mean time of New Zealand: in advance of Greenwich time by 11 hours 30 minutes.

123. Meteorological radiotelegrams are sent free of charge and as opportunity offers.

124. Greenwich time: October—March, 8 a.m. to 5 p.m.; holidays, 8 a.m. to 1 p.m. April—September, 8 a.m. to 2 p.m., 3 p.m. to 7 p.m.; holidays, 8 a.m. to 1 p.m.

125. The station is open only during the season of navigation, approximately from July to October.

126. The night service is performed alternately by the Flekkerö and Tjömö stations. Flekkerö is open during the nights of Tuesday, Thursday, and Saturday. Tjömö is open during the nights of Monday, Wednesday, and Friday. The service between 8 a.m. Sunday and 8 a.m. Monday is performed alternately by the two stations.

127. During the months from May to September.

128. During the months from October to April.

129. From the 15th of June to the 30th of September.

130. From the 1st of October to the 14th of June.

131. Röst and Sörvaagen intercommunicate by means of wireless telegraphy.

132. The station also exchanges radiotelegrams with the other coast stations situated in the Azores, within its radius of operation.

133. Public correspondence limited to the ships *Dacia CVD*, *Imparatul Traian*, *Principesa Maria*, *Regele Carol I* and *Romania*.

134. The station also communicates with Duluth (Minnesota).

135. The station communicates only with Nicolaiewsk RNL.

136. The station also communicates by radiotelegraphy with Kerbinskaia.

137. The station is reserved for the Service of the Gulf of Riga.

138. The station is open only during the season of navigation.

139. The coast charge is reduced to fr. 0.13 per word for correspondence with Russian ship stations.

140. For radiotelegrams exchanged between the stations Rade de Taganrog and Taganrog, there is an additional charge of fr. 0.40 per radiotelegram, plus fr. 0.025 per word.

141. The station transmits each day, at 1 p.m., a report in plain language containing information concerning the meteorological conditions prevailing on the whole of the coast of the Union of South Africa.

142. With the wave length of 1,800 metres.

143. The station transmits only correspondence of the Compagnia Trasatlantica.

144. The station exchanges radiotelegrams only with the steam ferries *Cabrillo* and *Hermosa*. The station also communicates with the coast station, East San Pedro (California).

145. Opened provisionally.

146. The station transmits time signals (standard convention symbols) twice daily, at noon and midnight, Adelaide time (9½ hours in advance of Greenwich time).

147. In the case of radiotelegrams addressed to the island of Fernando Po, the charge for delivery to destination is included in the coast charge. Moreover, there is no minimum charge for this class of message.

148. The station only exchanges official correspondence with other fixed stations.

149. Official correspondence with Sassnitz and with the ferry-boats of the Trälleborg-Sassnitz line, concerning the railway traffic.

150. The station only corresponds with the radiotelegraph stations situated in the Azores.

151. The station communicates only with San Francisco KFS, San Diego KSD (California) and Phoenix (Arizona).

152. The station is limited to correspondence with Scranton (Pennsylvania), Binghamton, Buffalo (New York State), and with trains of the Delaware, Lackawanna and Western Railroad Company. It is used in connection with that company's railroad business.

153. Acts as a retransmitting station for Port Nelson, Manitoba.

154. The station also exchanges public and official correspondence with Zanzibar.

155. The station also exchanges public and official correspondence with Pemba, Zanzibar.

156. Official correspondence with the Danish ferry-boats of the Gjedser-Warnemünde line, concerning the railway traffic.

157. The station sends time-signals for five minutes on wave-length of 2,500 metres, commencing at 11.55 a.m. and 9.55 p.m. (time of the meridian 75° west of Greenwich), every day, Sundays and holidays included. For full particulars see International Time and Weather Signals—United States of America.

158. For radiotelegrams exchanged with ships in North and South American service.

159. For radiotelegrams exchanged with ships in transoceanic service.

160. Each naval coast station situated within the continental limits of the United States of America and of Alaska, as soon as it is advised of any danger to navigation (the presence of derelicts, displacement of light-ships, etc., etc.), will immediately transmit the information on wave-lengths of 600 and 1,000 metres. Such information will be repeated at 8 a.m., noon, 4 p.m., and 8 p.m. (local standard time). Naval coast stations of the Atlantic receiving information of this kind will forward it by radiotelegraphy to Washington NAA Station. Each day at noon and 10 p.m. (time of the meridian 75° west of Greenwich), immediately following the time signal, the Washington NAA Station will signal broadcast such information relating to safe navigation as may be furnished by the Hydrographic Office during the preceding 24 hours. The same wave-length used in the time signal will be employed. All radiotelegraph stations will broadcast these messages in their turn on wave-lengths of 600 and 1,000 metres at 8 a.m., noon, 4 p.m., and 8 p.m. The foregoing procedure will also obtain on the Pacific Coast, with the difference that the reports of coast stations will be transmitted to San Francisco NPH, and will be re-transmitted by that station (for the present) to all other coast stations of the Pacific.

161. The station handles public correspondence in emergencies, when the coast rate will be furnished on request.

162. The station sends time signals daily, commencing at 11.55 a.m. and 9.55 p.m. (time of the meridian 75° west of Greenwich), Sundays and holidays included, on the wave-length of 1,500 metres. For full particulars see International Time and Weather Signals—United States of America.

163. The station sends time signals daily, commencing at 11.55 a.m. and 9.55 p.m. (time of the meridian 120° west of Greenwich), Sundays and holidays included, on the wave-length of 2,400 metres (damped and undamped waves). For full particulars see International Time and Weather Signals—United States of America.

164. The station communicates with the coast through Beaufort (North Carolina).

165. The station furnishes free information of interest to ships on request.

166. The operator is generally at the receiver at the beginning of each hour.

167. The station also communicates with New Orleans WNU.

168. The station sends time signals daily, commencing at 11.55 a.m. (time of the meridian 120° west of Greenwich), Sundays and holidays excluded, on the wave-length of 2,000 metres. For full particulars see International Time and Weather Signals—under United States of America.

169. Army Signal School.

170. Coast Artillery School.

171. When the lake is open to navigation.

172. The station communicates with the coast through Charleston (South Carolina) and Beaufort (North Carolina).

173. The station communicates with the coast through Newport (Rhode Island) NAF.

174. The station transmits daily news without charge, using the wave-length of 1,610 metres.

175. The wave-length of 1,800 metres is used for special correspondence.

176. The station only exchanges correspondence of private interest with the fixed stations of the International Milling Co.

177. The station is limited to correspondence with Canton (Ohio).

178. This station also communicates with Cordova, Kodiak, and Sitka (Alaska).

179. This station in pre-war time communicated with Eilvese (Germany). This service has, of course, been suspended.

180. This station in pre-war time communicated with Nauen (Germany). This service has, of course, been suspended.

181. The station also communicates with Juneau (Alaska).

182. The wave-length of 2,100 metres is employed for long-range correspondence.

183. The station transmits weather reports daily at 8 a.m. (time of the meridian 75° west of Greenwich).

184. Signal Corps Laboratory (experimental).

185. Bureau of Standards (experimental).

186. The station is limited to correspondence with stations of the Southern California Edison Company.

187. The station is operated in conjunction with the Marconi station, Philadelphia WHE, but is limited to communication with the New York WHI station.

188. The station is limited to communication with vessels entering and leaving the port of Portland, or bound to or from Columbia River points.

189. In case of failure of the Washington NAA high-power station, the time signals are sent out by the small set in the same station, and the Boston NAD, Newport NAF (Rhode Island), New York NAH, Norfolk (Virginia), and Charleston (South Carolina) stations are notified, and they each send the time signals broadcast daily at noon (Sundays and holidays excepted).

190. The long wave-length is used for inland communication.

191. The station also communicates with other coast stations in China.

192. Interior station.

193. Time of the east coast of China, eight hours in advance of Greenwich time.

194. Correspondence restricted to the exchange of radiotelegrams with the other lighthouses in Chosen, with the ship *Kosai Maru* belonging to the Chosen Government and with Japanese warships.

195. A service giving warning of the passage of cyclones has been organised, as an experiment, on the east, north-west, and west coasts of Madagascar.

The warning telegram, originating at the Observatory at Antananarivo, will be sent out at the even hours (except between midnight and 6 a.m.) during the probable continuance of the cyclone in the zone within range of the stations. The warning will be sent out alternately by the Dzaoudzi and Majunga stations in the case of a cyclone affecting the region to the north-west of Madagascar or the Mozambique Channel, and alternately by the Dzaoudzi and Diégo-Suarez stations in the case of a cyclone affecting the regions to the north-east and east of Madagascar.

This telegram will be preceded and followed by the warning signal ———— repeated at short intervals. If the warning signal only is sent out it will indicate, in the absence of precise information, that there is reason to expect the passage of a cyclone.

During the whole of this service the Dzaoudzi, Majunga, and Diégo-Suarez stations will remain on the watch, outside the regular hours of working, during the first quarter of each hour, except between 12.15 p.m. and 6 a.m.

196. This station communicates only with Fairbanks (Alaska).

197. This station also exchanges public correspondence with Juneau, Ketchikan, Sitka, and Wrangell (Alaska).

198. This station also exchanges public correspondence with Port Walter (Alaska).

199. Rate applicable to radiotelegrams to or from vessels trading exclusively (a) between New Zealand and Australia, and (b) on the New Zealand coast.

200. For press radiotelegrams the coast station rate is fr. 2.52 per 100 words or fraction thereof.

201. In addition, a continuous listening service for distress signals will be maintained.

202. Radiotelegrams can be sent from ships to Chatham Islands to be relayed by that station to a coast station situated in New Zealand. A relaying rate of fr. 0.42 is charged in addition to the ordinary coast station tax due to the coast station on the New Zealand coast.

203. The station also communicates by radiotelegraphy with other stations in North Borneo.

204. If necessary.

205. Lighthouse.

206. La Romana and San Domingo also communicate with each other by radiotelegraphy. Charge per word : fr. 0.40 without a minimum. This charge is reduced to fr. 0.20 for telegrams sent on the service of the San Domingo Government.

207. For ordinary radiotelegrams.

208. For radiotelegrams sent on the service of the San Domingo Government.

209. Time of the meridian 90° west of Greenwich, attendance as follows :—

For limited Public Service with Mobile, the first 25 minutes of each hour from 6 a.m. to 6 p.m.

For General Public Service (working with ships), 25th to 30th minute of each hour from 6 a.m. to 6 p.m.

210. For radiotelegrams transmitted a distance exceeding 400 miles.

211. This station connects with the International Telegraph system through Port Etienne and Rufisque.

212. The station also communicates with Frankfort (Michigan).

213. The station also communicates with Grand Haven.

214. Operated by the United States War Department, Washington, D.C.

215. The station also communicates with Avalon (California).

216. The station also communicates with Koko Head KHJ (Hawaiian Islands), Juneau and Ketchikan (Alaska).

217. The station communicates only with Bolinas (California), Tahiti (French Oceania), and Funabashi (Japan).

218. Address and signature free of charge.

219. The coast charge given is applicable to radiotelegrams worded in plain Spanish language; for radiotelegrams in code or worded in a language other than Spanish the coast charge is doubled.

220. The station communicates only with Koko Head KIE (Hawaiian Islands).

221. The station communicates only with Scranton (Pennsylvania), and with stations on moving trains between Hoboken (New Jersey), and Buffalo (New York State).

222. The station also communicates with Fort Morgan (Alabama) WFM.

223. Time of the meridian 90° west of Greenwich, attendance as follows:—September 16th to October 1st, and June 7th to June 30th: sunset to sunrise. July 1st to September 15th: 1 a.m. to 6 a.m., 7 a.m. to noon, 1 p.m. to 6 p.m., 7 p.m. to midnight.

224. Time of the meridian 90° west of Greenwich, attendance as follows:—

For limited Public Service with Fort Morgan, the first 25 minutes of each hour from 6 a.m. to 6 p.m.

For General Public Service (working with ships), the last 35 minutes of each hour from 6 a.m. to 6 p.m., and continuous service from 6 p.m. to 8.30 p.m.

225. Time of the meridian 75° west of Greenwich, attendance as follows:—September 16th to December 15th, and April 15th to June 2nd: 7 p.m. to midnight, 1 a.m. to 7 a.m. June 3rd to September 15th: 7 a.m. to noon, 1 p.m. to 6 p.m., 7 p.m. to midnight, 1 a.m. to 6 a.m.

226. Time of the meridian 120° west of Greenwich. The station is open during the first and last fifteen minutes of each hour, from 8 a.m. to 6 p.m.

227. For radiotelegrams exchanged with ships plying between New York City and points less than 200 miles distant by water.

228. The station also communicates with Burrwood and Colon.

229. The station only exchanges correspondence of private interest with Guantanamo (Cuba) and Bowden (Jamaica).

230. The station communicates only with Binghamton and with stations on moving trains between Hoboken (New Jersey) and Buffalo (New York State).

231. The station also communicates with San Diego KSD (California), Los Angeles (California), Portland KGN (Oregon), and Pearl Harbor (Hawaiian Islands).

232. The station also communicates with Los Angeles (California), San Diego KSD (California), and Portland KGN (Oregon).

233. Time of the meridian 90° west of Greenwich, 7.15 a.m. to 8 a.m., 8.40 a.m. to 9 a.m., 10.15 a.m. to 10.55 a.m., 11.40 a.m. to noon, 1.15 p.m. to 2 p.m., 3.15 p.m. to 4 p.m., 5.15 p.m. to 6 p.m., 8.15 p.m. to 8.55 p.m., 10.15 p.m. to 11 p.m.

234. With the wave-length of 600 metres.

235. The station also exchanges correspondence with Nassau (Bahamas).

236. For radiotelegrams exchanged with ships making voyages between New York and ports not exceeding 200 miles distant.

237. For radiotelegrams exchanged with ships making voyages between ports on the American continent more than 200 miles distant from New York.

238. The station also communicates with South San Francisco and Portland KGN (Oregon).

239. The station is limited to correspondence with Lahaina.

240. The station communicates only with Seattle KPA (United States of America).

241. Continuous service is performed provisionally.

242. The station belongs to Marconi's Wireless Telegraph Company, London, and the Eastern Telegraph Company, London; it is operated and controlled by the latter Company.

243. The station is owned by the United States Government (Bureau of Lighthouses), but is operated and controlled by Snare and Triest Co.

244. The handling of correspondence is temporarily suspended, with the exception of distress messages and messages in plain language exchanged between officials or passengers of vessels and the agencies of such vessels, provided that they contain only matter relating to the affairs of the companies or passengers.

245. Italian Somaliland official time three hours in advance of Greenwich time. (Longitude 45° east of Greenwich.)

246. With the wave-length of 2,500 metres.

247. For radiotelegrams exchanged with ships subject to the administration of Australia or of New Zealand.

248. Meteorological radiotelegrams are exchanged with vessels free of charge.

249. For radiotelegrams exchanged with ships other than those subject to the administration of Australia or of New Zealand.

250. When necessary, or when requested by vessels, the station transmits weather forecasts.

251. The station will accept general public messages in emergencies, when open.

252. The stations *Choshi Radio*, *Fukkikaku*, and *Dairenwan* transmit warnings of typhoons, given by the Central Meteorological Office at Tokio for ships at sea. No charge is made for this transmission, except in cases where the warnings are transmitted specially at the request of ships. For full particulars see International Time and Weather Signals—Japan.

253. No charge is made for relaying messages.

254. Coastal military station.

255. Operated by the United States Signal Corps, War Department, Washington, D.C.

256. Operated by the United States Naval Communication Service, Radio, Virginia.

257. The station is located at Navy Yard.

258. The station only communicates with the owner's yacht.

259. Operated by the Philippine Insular Government.

260. No charge is made for radiotelegrams to or from vessels of the United States Navy.

261. The station communicates only with Oakland (California).

262. Public correspondence is admitted on behalf of the crews of ships.

263. The station will signal daily weather reports and forecasts, relating to the Pacific Ocean, prepared by the United States Weather Bureau at Honolulu. The messages will be transmitted broadcast at 8 a.m., noon, 4 p.m., and 8 p.m. (local time).

264. Certain islands in Australasia and the Pacific are connected with the International Telegraph system by radiotelegraphy at the points given hereunder :

(a) Apia (Samoa Islands)—through Awanui Radio, New Zealand (normal route) or Suva, Fiji Islands (alternative route).

(b) Flinders Island—through Melbourne Radio.

(c) Kieta (Bougainville, Solomon Islands)—through Woodlark Island and Townsville Radio.

(d) King Island—through Melbourne Radio.

(e) Macquarie Island—through Hobart Radio.

(f) Madang (British New Guinea)—through Port Moresby and Thursday Island Radio.

(g) Nauru (Marshall Islands)—through Woodlark Island and Townsville Radio.

- (h) Ocean Island (Gilbert Islands)—through Nauru, Woodlark Island and Townsville Radio.
- (i) Papeete (Tahiti, French Oceania)—through Apia (Samoa Islands), and Awanui Radio, New Zealand.
- (j) Port Moresby (British New Guinea)—through Thursday Island.
- (k) Rabaul (New Britain)—through Woodlark Island and Townsville Radio.
- (l) Tulagi (Solomon Islands)—through Woodlark Island and Townsville Radio.
- (m) Woodlark Island—through Townsville Radio.

265. Public correspondence with the Japanese ship stations. The station also communicates with the other coast stations in Japan.

266. The wave-length of 750 metres is used for correspondence with fixed stations.

267. The charge is reduced to 20 centimes for correspondence with ships engaged in a regular service on the coast of New Caledonia and Dependencies.

268. The Naval Observatory at Dársena Norte (through the Dársena Norte radiotelegraph station) sends out five time-signals each day (except Sundays and holidays) on the wave-length of 800 metres. For full particulars see International Time and Weather Signals—Argentina.

269. The reception and despatch of messages may be suspended for short periods, and the station is subject to be closed at short notice.

270. The station is limited to correspondence with Denver (Colorado).

271. Operated by the United States Coast Guard, Treasury Department, Washington, D.C.

272. The station sends time signals daily, commencing at 11.55 a.m. (time of the meridian 75° west of Greenwich), Sundays and holidays included, on the wave-length of 1,000 metres. For full particulars see International Time and Weather Signals—United States of America.

273. The station sends time signals daily, commencing at 11.55 a.m. (time of the meridian 120° west of Greenwich), Sundays and holidays excluded, on the wave-length of 2,800 metres. For full particulars see International Time and Weather Signals—United States of America.

274. The station sends time signals daily, commencing at 11.55 a.m. (time of the meridian 120° west of Greenwich), Sundays and holidays excluded, on the wave-length of 1,512 metres. For full particulars see International Time and Weather Signals—United States of America.

275. The station receives the time of the 8th time-belt (120° east of Greenwich) from the Observatory of Zikawei; and transmits it on the wave-length of 600 metres. For full particulars see International Time and Weather Signals—China.

276. The station only exchanges correspondence of private interest with other fixed stations.

277. The station communicates with the stations of the Red Salmon Canning Company. The station also exchanges correspondence with fixed stations.

278. The station only exchanges correspondence with other fixed stations.

279. The station also communicates with fixed stations.

280. The operator listens in at intermittent times on the hour and half hour.

281. Training school station. Operated by the Coast Artillery Corps, United States Army, Washington D.C.

282. The station is restricted to communication with the vessels *Marquette and Bessemer* No. 1, and *Marquette and Bessemer* No. 2.

283. Great Lakes training station.

284. Time of the meridian 75° west of Greenwich: 8.30 a.m., 9.30 a.m., 10.30 a.m., 11.30 a.m., 12.30 p.m., 1.30 p.m., 2.30 p.m., 3.30 p.m., 4.30 p.m.

285. The station is open approximately from April to October.

286. The station is limited to correspondence with the ship stations of the Alaska Packers' Association. The station also exchanges correspondence of private interest with other fixed stations.

287. The station is open only from the 1st July to the 20th August, approximately.

288. The station also communicates with Los Angeles (California).

289. Moored schooner.

290. The station is limited to correspondence with Nushagak KMG and Clarks Point.

291. The wave-lengths of 2,000 and 2,500 metres are used for messages exchanged with the neighbouring islands. The station replies on the wave-length of 2,500 metres to calls from distances exceeding 400 miles.

292. The station also communicates with Phoenix (Arizona), San Diego KSD (California), and San Francisco KFS.

293. The station is limited to correspondence with the Sitka and Juneau (Alaska) coast stations, and with ships of the Alaska Steamship Company and the Pacific Coast Steamship Company.

294. The station communicates only with Pittsburg (Kansas) and Wichita (Kansas).

295. The station communicates only with Pittsburg (Kansas) and Independence (Kansas).

296. The station sends time signals daily, commencing at 12.55 p.m. (time of the meridian 75° west of Greenwich), on a wave-length of 4,000 metres. For full particulars see International Time and Weather Signals—United States of America (Panama Canal Zone).

297. At present this station only communicates with Thorshavn (Faroe Islands), using the 500 metre wave-length. The service may be extended to communication with ship stations at a later date.

298. At present this station only communicates with Tveraa (Faroe Islands), using the 500 metre wave-length. The service may be extended to communication with ship stations at a later date.

299. The station transmits time signals (standard convention symbols) on a 600 metre wave-length twice daily, at 11 a.m. and 11 p.m., Standard Western Australian time (8 hours in advance of Greenwich time).

300. The working hours between Monday and Friday are divided into four sections, starting respectively at 10 a.m., noon, 3 p.m., and continuous service between 7 p.m. and midnight. For the first three sections the station continues working until the completion of the messages in hand and then closes down. There are only three working-hour sections on Saturday, at 10 a.m., noon, and from 7 p.m. to midnight, and the same conditions with regard to working apply as on other week-days.

301. The station also exchanges official and public correspondence with Nauru, Tulagi and Apia.

302. The station also exchanges official and public correspondence with Washington Island.

303. The station also exchanges official and public correspondence with Fanning Island.

304. The station sends time signals daily, commencing at 11.55 a.m. (time of the meridian 120° west of Greenwich), Sundays and holidays excluded, on the wave-length of 2,400 metres. For full particulars see International Time and Weather Signals—United States of America.

305. The station sends time signals daily, commencing at 9.55 p.m. (time of the meridian 90° west of Greenwich), Sundays and holidays included, on the wave-length of 1,512 metres. For full particulars see International Time and Weather Signals—United States of America.

306. The station will signal daily weather reports and forecasts, relating to the North Atlantic Ocean, prepared by the United States Weather Bureau. The messages will be transmitted immediately after the time signals and hydrographic information at 10 p.m. (time of the meridian 75° west of Greenwich). The same wave-length used in the time signals will be employed. All naval coast stations will repeat these messages to passing vessels on request, whenever practicable. For full particulars see International Time and Weather Signals—United States of America.

307. The station will signal daily weather reports and forecasts, relating to the Great Lakes, prepared by the United States Weather Bureau. The messages will be transmitted immediately after the time signals and hydrographic information at 10 p.m. (time of the meridian 90° west of Greenwich). The same wave-length used in the time signals will be employed. For full particulars see International Time and Weather Signals—United States of America.

308. The station will signal daily weather reports and forecasts, relating to the Pacific Coast, prepared by the United States Weather Bureau at San Francisco. For full particulars see International Time and Weather Signals—United States of America.

309. Local weather reports, preceded by the letter "T," are transmitted broadcast by the station at 8 a.m., noon, 4 p.m., and 8 p.m. (local time).

SHIP STATIONS

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
ARGENTINE (REPUBLIC)							Francs.	Francs.
Alvarez Mackinlay	LNB	—	Navy	450, 800	O ..	N	—	—
Almirante Brown	LKA	—	Navy	450, 800	O ..	N	—	—
Americano ⁸⁰	LMF	270	Soc. Impta. y Expia. de la Patagonia	300, 800	P G	N	0.40	4.00
Argentino LMS ⁸⁰	LMS	260	Soc. Impta. y Expia. de la Patagonia	300, 800	P G	N	0.40	4.00
Aristobulo del Valle	LKX	—	Government	300, 450, 800	O ..	N	—	—
Asturiano ⁸⁰	LMT	260	Soc. Impta. y Expia. de la Patagonia	300, 800	P G	N	0.40	4.00
Azapardo	LNF	—	Navy	300, 450, 800	O ..	N	—	—
Belgrano LKB ⁸⁰	LKB	—	Navy	450, 800	O ..	N	—	—
Berna ⁸⁰	LLN	135	Compañía Argentina de Nav. (Nicolás Mihanovich), Ltd.	300, 800	P G	N	0.40	4.00
Bruselas ⁸⁰	LLO	135	Compañía Argentina de Nav. (Nicolás Mihanovich), Ltd.	300, 800	P G	N	0.40	4.00
Buenos Aires LKC	LKC	—	Navy	450, 800	O ..	N	—	—
Buenos Aires LLP ⁸⁰	LLP	135	Compañía Argentina de Nav. (Nicolás Mihanovich), Ltd.	300, 800	P G	N	0.40	4.00
Cabo Corrientes ⁸⁰	LMO	300	A. M. Delfino y Hermano (Hamburg Sud-Am. D. S. Ges.)	300, 800	P G	N	0.40	4.00
Cabo Santa Maria ⁸⁰	LMN	300	A. M. Delfino y Hermano (Hamburg Sud-Am. D. S. Ges.)	300, 800	P G	N	0.40	4.00
Camarones ⁸⁰	LME	600	A. M. Delfino y Hermano (Hamburg Sud-Am. D. S. Ges.)	300, 450, 800	P G	N	0.40	4.00
Catamarca	LKD	—	Navy	450, 800	O ..	N	—	—
Chaco ¹⁸⁰	LKE	—	Government	450, 800	O ..	N	—	—
Colonia LLQ ⁸⁰	LLQ	135	Compañía Argentina de Nav. (Nicolás Mihanovich), Ltd.	300, 800	P G	N	0.40	4.00
Cordoba LKF	LKF	—	Navy	450, 800	O ..	N	0.40	4.00
Corrientes LNG	LNL	—	Navy	800, 450	O ..	N	0.40	4.00
Draga 13	LNG	55	Government (Dept. of Public Works)	400	O ..	N	—	—
Draga 14-C	LNK	60	Government	400	O ..	N	—	—
Draga 16-C	LMQ	100	Government	450	O ..	N	—	—
Draga 209	LLH	—	Government	500	O ..	N	—	—
Draga 210	LLI	—	Government	500	O ..	N	—	—
Draga 211	LLJ	—	Government	500	O ..	N	—	—
Draga 212-C	LMW	216	Government	2,000	O ..	N	0.40	4.00
El Plata LKG	LKG	—	Navy	450, 800	O ..	N	—	—

9 a.m. to 11 a.m.,
3 p.m. to 5 p.m.

9 a.m. to 11 a.m.,
3 p.m. to 5 p.m.

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
AUSTRALIAN COMMONWEALTH							Francs.	Francs.
Australia VKA	VKA	—	Navy	600	O	Limited	—	—
Bombala ¹	VHF	250	Australian Steamships, Ltd.	300, 800	P	—	0.20	—
Brisbane VKB	VKB	—	Navy	600	O	—	—	—
Canberra ¹	VHO	250	Australian Steamships, Ltd.	300, 800	P	Limited	0.20	—
Cerberus	VKO	—	Government	600	O	—	—	—
Cockburn Sound Base	VKR	—	Government	600	O	—	—	—
Cooma ¹	VJE	250	Australian Steamships, Ltd.	300, 800	P	Limited	0.20	—
Derwent VKK	VKK	—	Navy	600	P	—	—	—
Dimboola ¹	VHL	240	Melbourne S.S. Co.	300, 800	P	Limited	0.20	—
Encounter	VKE	—	Navy	600	O	—	—	—
Fiona ¹	VIIQ	240	Colonial Sugar Refining Co.	300, 800	P	—	0.20	—
Flinders Island Base	VKP	—	Government	600	O	—	—	—
Garden Island Base	VKP	—	Government	600	O	—	—	—
Indarra ¹	VHP	240	Australasian United S.N. Co.	300, 800	P	Limited	0.20	—
Kanowna ¹	VHD	250	Australasian United S.N. Co.	300, 800	P	Limited	0.20	—
Karoela ¹	VHE	240	McLwruth, McEacham's Line Prop'ry, Ltd.	300, 800	P	—	0.20	—
Katoomba ¹	VHN	300	McLwruth, McEacham's Line Prop'ry, Ltd.	300, 800	P	Limited	0.20	—
Kyarra ¹	VHC	250	Australasian United S.N. Co.	300, 800	P	Limited	0.20	—
Levuka ¹	VHB	250	Australasian United S.N. Co.	300, 800	P	Limited	0.20	—
Mataram ¹	VHU	240	Burns, Philp & Co.	300, 800	P	Limited	0.20	—
Melbourne VKC	VKC	—	Navy	600	O	—	—	—
Montoro ¹	VHT	240	Burns, Philp & Co.	300, 800	P	Limited	0.20	—
Morinda ¹	VIF	240	Burns, Philp & Co.	300, 800	P	Limited	0.20	—
Navy Office	VKN	—	Government	600	O	—	—	—
Parramatta	VKJ	—	Navy	600	O	—	—	—
Pioneer VKF	VKF	—	Navy	600	O	—	—	—
Port Stephens Base	VKS	—	Government	600	O	—	—	—
Protector	VKG	—	Navy	600	O	—	—	—
Riverina ¹	VIA	250	Huddart Parker, Ltd.	300, 800	P	Limited	0.20	—
Swan ¹	VII	200	Australasian United S.N. Co.	300, 800	P	—	0.20	—
Sydney VKD	VKM	—	Navy	600	O	—	—	—
Torrens	VKL	—	Navy	600	O	—	—	—
Ullmaroa ¹	VHY	250	Huddart Parker, Ltd.	300, 800	P	Limited	0.20	—
Una (ex Komet—see GERMANY)	—	—	—	—	—	—	—	—
Victoria VHX ¹	VHX	250	Huddart Parker, Ltd.	300, 800	P	Limited	0.20	—
Wandilla ¹	VHI	240	Adelaide S.S. Co.	300, 800	P	Limited	0.20	—
Warilda ¹	VHH	240	Adelaide S.S. Co.	300, 800	P	Limited	0.20	—

Wilcochra ¹	..	230	VHG	Day, 400; night, 700	Austrian Lloyd ¹ ..	..	300, 450, 600	P G	..	Limited	..	0.20
Wimmera ¹	..	230	VHZ	Day, 400; night, 700	Unione Austriaca di Nav. ¹	..	300, 450, 600	P G	..	..	..	0.20
Wyandra ¹	..	240	VHW	Day, 400; night, 700	Unione Austriaca di Nav. ¹	..	300, 450, 600	P G	..	..	..	0.20
Wyrcema ¹	..	200	VJG	Day, 400; night, 700	Unione Austriaca di Nav. ¹	..	300, 450, 600	P G	..	..	..	0.20
Yarra VKI	..	—	VKI	Day, 150; night, 250	Austrian Lloyd ¹ ..	..	300, 450, 600	P G	..	..	..	0.20
Zealandia VJC ¹	..	240	VJC	Day, 400; night, 700	Unione Austriaca di Nav. ¹	..	300, 450, 600	P G	..	Limited	..	0.20
AUSTRIA¹⁰⁰												
Africa OLA ¹	..	..	OLA	Day, 400; night, 700	Austrian Lloyd ¹ ..	..	300, 450, 600	P G	..	X	..	0.40
Alice OKI ¹ (interned in Brazilian port)	..	..	OKI	Day, 400; night, 700	Unione Austriaca di Nav. ¹	..	300, 450, 600	P G	..	N ²	..	0.40
Argentina ¹	..	..	OKG	Day, 400; night, 700	Unione Austriaca di Nav. ¹	..	300, 450, 600	P G	..	N ²	..	0.40
Atlanta ¹ (seized by Italian Govt.—see ITALY)	..	..	OKA	Day, 400; night, 700	Unione Austriaca di Nav. ¹	..	300, 450, 600	P G	..	N ²	..	0.40
Austria ¹	..	..	OLU	Day, 150; night, 250	Austrian Lloyd ¹ ..	..	300, 450, 600	P G	..	N ²	..	0.40
Belvedere ¹	..	..	OKB	Day, 400; night, 700	Unione Austriaca di Nav. ¹	..	300, 450, 600	P G	..	N ²	..	0.40
Bohemia OLB ¹ (now Hwah Ping—see CHINA)	..	..	OLB	Day, 150; night, 250	Austrian Lloyd ¹ ..	..	300, 450, 600	P G	..	N ²	..	0.40
China OLC ¹ (now Hwah Jah —see CHINA)	..	..	OLC	Day, 150; night, 250	Austrian Lloyd ¹ ..	..	300, 450, 600	P G	..	N ²	..	0.40
Cleopatra ¹	..	..	OLL	Day, 150; night, 250	Austrian Lloyd ¹ ..	..	300, 450, 600	P G	..	N ²	..	0.40
Columbia OKC ¹	..	..	OKC	Day, 400; night, 700	Unione Austriaca di Nav. ¹	..	300, 450, 600	P G	..	N ²	..	0.40
Erzerzog Franz Ferdinand OLE ¹ (seized by British Govt.—see GREAT BRITAIN)	..	..	OLE	Day, 150; night, 250	Austrian Lloyd ¹ ..	..	300, 450, 600	P G	..	N ²	..	0.40
Eugenia ¹ (seized by Italian Govt.—see ITALY)	..	..	OKE	Day, 400; night, 700	Unione Austriaca di Nav. ¹	..	300, 600	P G	..	N ²	..	0.40
Francaesca ¹	..	..	OKF	Day, 400; night, 700	Unione Austriaca di Nav. ¹	..	300, 450, 600	P G	..	N ²	..	0.40
Gablonz ¹	..	..	OLG	Day, 400; night, 700	Austrian Lloyd ¹ ..	..	300, 450, 600	P G	..	N ²	..	0.40
Habsburg OLR ¹	..	..	OLR	Day, 150; night, 250	Austrian Lloyd ¹ ..	..	300, 450, 600	P G	..	N ²	..	0.40
Helouan ¹	..	..	OLH	Day, 150; night, 250	Austrian Lloyd ¹ ..	..	300, 450, 600	P G	..	N ²	..	0.30
Kaiser Franz Josef I OKK ¹	..	..	OKK	Day, 400; night, 700	Unione Austriaca di Nav. ¹	..	300, 450, 600	P G	..	N	..	0.40
Koerber ¹ (now Huntspill—see GREAT BRITAIN)	..	..	OLK	Day, 400; night, 700	Austrian Lloyd ¹ ..	..	300, 450, 600	P G	..	X	..	0.40
Laura ¹ (interned in Brazilian port)	..	..	OKL	Day, 400; night, 700	Unione Austriaca di Nav. ¹	..	300, 450, 600	P G	..	N ²	..	0.40
Marienbad ¹ (now General Galieni—see FRANCE)	..	..	OLM	Day, 400; night, 700	Austrian Lloyd ¹ ..	..	300, 450, 600	P G	..	N ²	..	0.40

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
AUSTRIA 130.—contd.								
Martha Washington ¹ (seized by American Govt.—see U.S.A.)	OKM	Day, 400; night, 700	Unione Austriaca di Nav. ²	300, 450, 600	P G	N ² X ²	Francia. 0.40	Francia. 4.00
Mercedes II. ¹³⁰	OMA	Day, 150; night, 240	M. E. Jelinek Mercedes ²	300	P ²	X	—	—
Nippon ¹	OLN	Day, 150; night, 250	Austrian Lloyd ¹	300, 450, 600	P G	X	0.40	4.00
Oceania ¹	OKO	Day, 400; night, 700	Unione Austriaca di Nav. ²	300, 450, 600	P G	N ² X ²	0.40	4.00
Österreich ¹	OMC	Day, 150; night, 250	Austrian Antarctic Expedition ship	300, 450, 600 ²	P G	X	0.40	4.00
Persia OLP ¹	OLP	Day, 150; night, 250	Austrian Lloyd ¹	300, 450, 600	P G	X	0.40	4.00
Semiramis ¹	OLS	Day, 150; night, 250	Austrian Lloyd ¹	300, 450, 600	P G	X	0.40	4.00
Silesia O L J ¹ (now Hwah Yih —see CHINA)	OLJ	Day, 150; night, 250	Austrian Lloyd ¹	300, 450, 600	P G	X	0.40	4.00
Sofia Hohenberg ¹	OKH	Day, 400; night, 700	Unione Austriaca di Nav. ²	300, 450, 600	P G	N ² X ²	0.40	4.00
Thalia ¹	OLI	Day, 150; night, 250	Austrian Lloyd ¹	300, 450, 600	P G	X	0.40	4.00
Trieste ¹	OLT	Day, 150; night, 250	Austrian Lloyd ¹	300, 450, 600	P G	X	0.40	4.00
Venezia OMB ¹	OMB	Day, 100	Soc. Anon. di Nav. Rimorchi e Salvataggi (D. Tripovich & Co.)	300, 600	P G	8 a.m. to midday, 2 p.m. to 6 p.m.	0.10	1.00
Vorwaerts ¹ (now India—see PORTUGAL)	OLV	Day, 150; night, 250	Austrian Lloyd ¹	300, 450, 600	P G	X	0.40	4.00
Wien OLW ¹	OLW	Day, 150; night, 250	Austrian Lloyd ¹	300, 450, 600	P G	X	0.30	3.00
AUSTRIA-HUNGARY 131								
Admiral Spaun	UOB	—	Navy	600	O 32	N	—	—
Arpád ²	UOD	—	Navy	600	O 32	N	—	—
Aspern ²	UOI	—	Navy	600	O 32	N	—	—
Babenberg	UOQ	—	Navy	600	O 32	N	—	—
Balaton ²	UOV	—	Navy	300, 600	O 32	N	—	—
Bodrog ²	UOY	—	Navy	300, 600	O 32	N	—	—
Budapest	UPB	—	Navy	300, 600	O 32	N	—	—

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Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
BELGIUM								
Albertville ¹¹	OTV	200	Cie Belge Maritime du Congo	300, 450, 800	P G	N	Francs.	Francs.
Anversville ¹¹	ONV	200	Cie Belge Maritime du Congo	300, 450, 800	P G	N	0.40	4.00
Elbruz ^{11 91}	OOE	—	S.A. d'Armement d'Industrie et de Com.	—	—	—	0.40	4.00
Emanuel Nobel ^{11 91}	OOL	100-150	S.A. d'Armement d'Industrie et de Com.	300, 600	P G	X	0.40	4.00
Escaut ^{99 138}	OSE	100-150	Armement Deppe	300, 600	P G	N	—	—
Gothland ¹¹	ORG	—	Red Star Line	300, 800	P G	—	0.40	4.00
Grand Remorqueur ^{99 114}	OSR	30-50	Government	500-600	O ..	X	—	—
Jan Breydel ¹³	ONJ	60	Government	300	P R ¹³	— 14	— 15	— 15
L'Avenir ^{11 14}	ONE	170	Association Maritime Belge	300, 450, 800	P G	N	0.40	4.00
Léopold II. ¹³	OPD	60	Government	300	P R ¹³	— 14	— 15	— 15
Lydie ^{99 135}	OSL	100-150	Armement Deppe	300, 600	P G	N	—	—
Pieter De Coninck ¹³	OPK	60	Government	300	P R ¹³	— 14	— 15	— 15
Princesse Clémentine ¹³	OPC	60	Government	300	P R ¹³	— 14	— 15	— 15
Princesse Elisabeth ¹³	OPE	60	Government	300	P R ¹³	— 14	— 15	— 15
Princesse Henriette ¹³	OPH	60	Government	300	P R ¹³	— 14	— 15	— 15
Rapide (Le) ¹³	OPR	60	Government	300	P G	—	0.40	4.00
Samland ¹¹	ORS	—	Red Star Line	300, 800	P R ¹³	— 14	— 15	— 15
Stad Antwerpen ¹³	OPA	60	Government	300	P R ¹³	— 14	— 15	— 15
Ville de Liège ¹³	OPL	60	Government	300	P R ¹³	— 14	— 15	— 15
BRAZIL								
Acre ⁹⁹	SRF	250	Lloyd Brasileiro	300, 600	P G	X	0.40	—
Alagoas	SNA	60	Navy	300	O ¹¹¹	—	0.40	—
Alegrete (ex Salamanca—see GERMANY)	—	—	—	—	—	—	—	—
Alenas (ex San Nicolas—see GERMANY)	—	—	—	—	—	—	—	—
Almirante Jaceguay ⁹⁹	SRX	190	Lloyd Brasileiro	300, 600	P G	N	0.40	—
Amazonas	SOA	60	Navy	300	O ¹¹¹	—	0.40	—
Anna ⁹⁹	PUA	150	Hoepcke Carl, Junr.	300, 600	P G	X	0.40	—

Avaré (ex Sierra Salvada—see GERMANY)	..	..
Aymore ⁸³	..	..
Ayuruca (ex Roland — see GERMANY)	..	..
Baependy (ex Iijuca—see GERMANY)	..	..
Bage (ex Sierra Nevada—see GERMANY)	..	..
Bahia SNB	..	..
Bahia SRE ⁸³	..	..
Barroso ..	..	..
Belem ⁸³	..	..
Belmonte (ex Posen—see GERMANY)	..	..
Benevente (ex Rio Grande—see GERMANY)	..	..
Ben jamin Constant	..	..
Brazil SRM ⁸³	..	..
Cabedello (ex Prussia—see GERMANY)	..	..
Camamu (ex Steiermark—see GERMANY)	..	..
Campelo ⁸³	..	..
Campinas ⁸³	..	..
Campos (ex Asuncion—see GERMANY)	..	..
Canavieiras ⁸³	..	..
Carioca ..	..	..
Carlos Gomes	..	..
Caxias (ex Bahia-Laura—see GERMANY)	..	..
Ceará ⁸³	..	..
Commandante Belham ⁸³	..	..
Commandatbu ⁸³	..	..
Corcovado STN ⁸³	..	..
Curvello (ex Gertrud Woermann—see GERMANY)	..	..
Cuyaba (ex Hohenstaufen—see GERMANY)	..	..
Deodoro	..	..
Floriano	..	..
Florianopolis ⁸³	..	..
Goyaz ⁸³	..	..
Guarapes ⁸³	..	..
Guaratuba (ex Corrientes—see GERMANY)	..	..
Ihc-os ⁸³	..	..
Iris SRU ⁸³	..	..
Itabera	..	..
Itagiba ⁸³	..	..
Itauba ⁸³	..	..
Itanaracá ⁸³	..	..

SRJ	150	Lloyd Brasileiro ..	..	300, 600	P G	..	X	0.40
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
SNB	150	Navy ..	..	600	O III	..	—	0.40
SRE	250	Lloyd Brasileiro ..	..	300, 600	P G	..	X	0.40
SOB	150	Navy ..	..	600	O III	..	—	0.40
PVA	150	Cia Lloyd Nacional	..	300, 600	P G	..	N	0.40
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
SOC	150	Navy ..	..	600	O III	..	X	0.40
SRM	150	Lloyd Brasileiro ..	..	300, 600	P G	..	—	0.40
—	—	—	—	—	—	—	—	—
PVB	150	Cia Lloyd Nacional	..	300, 600	P G	..	N	0.40
PVD	90	Cia Lloyd Nacional	..	300, 600	P G	..	N	0.40
—	—	—	—	—	—	—	—	—
PUO	150	Navegação Bahiana	..	300, 600	P G	..	X	0.40
SOV	30	Government ..	..	150	O III	..	—	0.40
SOE	80	Government ..	..	300	O III	..	—	0.40
—	—	—	—	—	—	—	—	—
SRD	250	Lloyd Brasileiro ..	..	300, 600	P G	..	X	0.40
SSB	90	Lloyd Brasileiro ..	..	300, 600	P G	..	N	0.40
PUQ	150	Navegação Bahiana	..	300, 600	P G	..	X	0.40
STN	150	Cia Comercio e Navegação	..	300, 600	P G	..	N	0.40
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
SND	150	Navy ..	..	600	O III	..	—	0.40
SNF	150	Navy ..	..	600	O III	..	—	0.40
SRZ	150	Lloyd Brasileiro ..	..	300, 600	P G	..	N	0.40
SSC	150	Lloyd Brasileiro ..	..	300, 600	P G	..	N	0.40
PUT	150	Navegação Bahiana	..	300, 600	P G	..	X	0.40
—	—	—	—	—	—	—	—	—
PUN	150	Navegação Bahiana	..	300, 600	P G	..	X	0.40
SRU	150	Lloyd Brasileiro ..	..	300, 600	P G	..	X	0.40
STK	250	Cia Nac. de Navegação Costeira	..	300, 600	P G	..	N	0.40
STF	250	Cia Nac. de Navegação Costeira	..	300, 600	P G	..	X	0.40
STG	240	Cia Nac. de Navegação Costeira	..	300, 600	P G	..	N	0.40
SIL	120	Cia Nac. de Navegação Costeira	..	300, 600	P G	..	N	0.40

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
BRAZIL—contd.								
Itapema ⁸³	..	240	Cia Nac. de Navegação Costeira ..	300, 800	P G	N	Francs. 0.40	—
Itapuca ⁸³	..	240	Cia Nac. de Navegação Costeira ..	300, 600	P G	N	0.40	—
Itaputity ⁸³	..	250	Cia Nac. de Navegação Costeira ..	300, 800	P G	N	0.40	—
Itapura ⁸³	..	250	Cia Nac. de Navegação Costeira ..	300, 800	P G	N	0.40	—
Itaquera ⁸³	..	250	Cia Nac. de Navegação Costeira ..	300, 800	P G	N	0.40	—
Itassucé ⁸³	..	250	Cia Nac. de Navegação Costeira ..	300, 800	P G	N	0.40	—
Itatinga ⁸³	..	250	Cia Nac. de Navegação Costeira ..	300, 800	P G	N	0.40	—
Itauba ⁸³	..	240	Cia Nac. de Navegação Costeira ..	300, 800	P G	N	0.40	—
Itu (ex Cap Roca—see GERMANY)	..	—	—	—	—	—	—	—
Jaguarão ⁸³	..	30	Navy	100	O III	—	0.40	—
Javary ⁸³	..	150	Lloyd Brasileiro ..	300, 800	P G	X	0.40	—
Jequitinhonha ⁸³	..	150	Navegação Bahiana ..	300, 800	P G	X	0.40	—
Ladario ⁸³	..	150	Lloyd Brasileiro ..	300, 800	P G	X	0.40	—
Lages (ex Rautenfels—see GERMANY)	..	—	—	—	—	—	—	—
Laguna ⁸³	..	150	Lloyd Brasileiro ..	300, 800	P G	N	0.40	—
Laurindo Pitta ⁸³	..	50	Government	300	O III	—	0.40	—
Leopoldina (ex Blücher—see GERMANY)	..	—	—	—	—	—	—	—
Manoás ⁸³	..	150	Lloyd Brasileiro ..	300, 800	P G	X	0.40	—
Marabá ⁸³	..	150	Navegação Bahiana ..	300, 800	P G	X	0.40	—
Maranhão ⁸³	..	150	Lloyd Brasileiro ..	300, 600	P G	X	0.40	—
Matto Grosso ⁸³	..	60	Navy	300	O III	—	0.40	—
Mercêdes SRO ⁸³	..	150	Lloyd Brasileiro ..	300, 800	P G	X	0.40	—
Minas Geraes SNM	..	450	Navy	600	O III	—	0.40	—
Minas Geraes SRB ⁸³	..	250	Lloyd Brasileiro ..	300, 600	P G	X	0.40	—
Neuquen ⁸³	..	120	Cia Lloyd Nacional	300, 800	P G	N	0.40	—
Olinda ⁸³	..	150	Lloyd Brasileiro ..	300, 800	P G	X	0.40	—
Oyapock ⁸³	..	190	Lloyd Brasileiro ..	300, 600	P G	X	0.40	—
Palmares (ex Valesia—see GERMANY)	..	—	—	—	—	—	—	—
Para SNE	..	60	Navy	300	O III	—	0.40	—
Para SRO ⁸³	..	250	Lloyd Brasileiro ..	300, 800	P G	X	0.40	—
Parahyba	..	60	Navy	300	O III	—	0.40	—
Paraná SNH	..	60	Navy	300	O III	—	0.40	—
Parnahyba (ex Alrich—see GERMANY)	..	—	—	—	—	—	—	—

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Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
CANADA AND NEWFOUNDLAND								
Aberdeen ¹⁶	VDC	100	Government	300	O	X	—	—
Acadia ¹⁶	VDT	200	Government	300, 600	O	X	—	—
Alberta VFO ¹⁷	VFO	200	Canadian Pacific Railway Co.	300, 600	P G	X	0.40	—
Algerine ¹⁷	VOL	150	—	300, 600	P G	X	0.40	—
Aquilo ^{16 80}	VFU	80	B. D. Rogers, Vancouver	300	P	X	—	—
Arammore VDO ¹⁶	VDO	200	Government	300, 600	O	X	—	—
Assiniboia ¹⁷	VGI	200	Canadian Pacific Railway Co.	300, 600	P G	N	0.40	—
Atlabaska ¹⁷	VGG	200	Canadian Pacific Railway Co.	300, 600	P G	N	0.40	—
Bermudian ¹⁷	—	200	Canada Steamship Lines (Quebec S.S. Division)	300, 600	P G	N	0.40	—
Bessie Dollar ¹⁷	VFO	200	Dollar S.S. Lines, Ltd.	300, 600	P G	N	—	—
Canosun ⁸⁰	VFC	200	Union S.S. Co. of B.C.	300, 600	P G	N	0.40	—
Canada VDC ¹⁶	VDC	150	Government	300, 600	O	X	—	—
Cascadia ¹⁷	VBO	200	Canada S.S. Lines, Ltd.	300, 600	P G	N	0.40	—
Cayuga ¹⁷	VEL	100	Canada S.S. Lines, Ltd.	300, 600	P G	N	0.40	—
Chelonin ⁸⁰	VGN	200	Union S.S. Co. of B.C.	300, 600	P G	N	0.40	—
Chicora ¹⁷	VEJ	100	Canada S.S. Lines, Ltd.	300, 600	P G	N	0.40	—
Chippewa ¹⁷	VEH	100	Canada S.S. Lines, Ltd.	300, 600	P G	N	0.40	—
Corona ¹⁷	VEB	100	Canada S.S. Lines, Ltd.	300, 600	P G	N	0.40	—
Dalhousie City ¹⁷	VEA	100	Niagara, St. Catharines and Toronto Nav. Co.	300, 600	P G	N	0.40	—
Dollard ¹⁶	VDO	150	Government	300	O	X	—	—
Douglas H. Thomas ¹⁷	VGR	125	Dominion Coal Co.	300, 600	P G	X	0.40	—
Druid VDH ¹⁶	VDH	100	Government	300, 600	O	X	—	—
Eagle VOU ¹⁷	VOU	150	Bowring Bros.	300, 600	P G	X	0.40	—
Empire ^{17 119}	VFP	200	Canadian Towing & Wrecking Co.	300, 600	P G	N	0.40	—
Empress of Asia ¹⁷	—	250	Canadian Pac. Rly. Ocean Lines	300, 600	P G	X	0.40	—
Empress of Japan ¹⁷	—	250	Canadian Pac. Rly. Ocean Lines	300, 600	P G	X	0.40	—
Empress of Russia ¹⁷	—	250	Canadian Pac. Rly. Ocean Lines	300, 600	P G	X	0.40	—
Estevan ¹⁶	VDN	200	Government	300, 600	O	X	—	—
Everett G. Griggs ⁸⁰	VGO	100	Everett G. Griggs Ship Co.	300, 600	P G	X	0.40	—
Florence ^{4 80}	VFI	150	T. Eaton	300, 600	P	X	—	—
Galliano ¹⁶	VDV	200	Government	300, 600	O	X	—	—
Garden City ¹⁷	VEI	100	Niagara, St. Catharines and Toronto Nav. Co.	300, 600	P G	N	0.40	—
Guiana ¹⁷	—	200	Canada Steamship Lines (Quebec S.S. Division)	300, 600	P G	N	0.40	—
Halifax ¹⁷	VGP	200	Canada Atlantic & Plant S.S. Co.	300, 600	P G	N	0.40	—
Hamonic ¹⁷	VGD	200	Canada S.S. Lines, Ltd.	300, 600	P G	N	0.40	—

Kewatin 17	VGC	200	Canadian Pacific Railway Co.	..	300, 800	P G	..	..	0.40
Kingston 17	VGC	100	Canada S.S. Lines, Ltd.	..	300, 800	P G	..	..	0.40
Korona 17	—	200	Canada Steamship Lines (Quebec S.S. Division)	..	300, 800	P G	..	..	0.40
Kyle 40	VOR	150	Reid Newfoundland Co.	..	300, 800	P G	..	..	0.40
Lady Evelyn 84	VDN	100	Government	..	300, 800	O	..	..	—
Lady Gray 18	VDL	100	Government	..	300	O	..	..	—
Lady Laurier 18	VFL	150	Government	..	300	O	..	..	—
Lord Stratthcona 17 118	VFX	80	Quebec Salvage & Wrecking Co.	..	300	P G	..	..	0.40
Marcella 17	VFK	100	Government	..	300, 800	P G	..	..	0.40
Majestic VEM 17	VEM	100	Canada S.S. Lines, Ltd.	..	300, 800	P G	..	..	0.40
Malaspina 16	VGU	200	Government	..	300, 800	O	..	..	—
Maulitoba 17	VGU	200	Canadian Pacific Railway Co.	..	300, 800	P G	..	..	0.40
Margaret VDW 10	VDW	200	Government	..	300, 800	O	..	..	—
Montcalm VDJ 18	VDJ	250	Government	..	300, 800	O	..	..	—
Monteagle 17	—	250	Canadian Pac. Ry. Ocean Lines	..	300, 800	P G	..	..	0.40
Neptune VOX 17	VOX	150	Neptune Steamships Co., Ltd.	..	300, 800	P G	..	..	0.40
Newington 18	VDP	100	Government	..	300	O	..	..	—
Niebo VDA 16	VDA	200	Navy	..	300, 800	O	..	..	—
Noronic 17	VGV	300	Canada S.S. Lines, Ltd.	..	300, 800	P G	..	..	0.40
Ontario No. 188	VGU	200	Ontario Car Ferry Co., Ltd.	..	300, 800	P G	..	..	0.40
Parima 17	—	200	Canada Steamship Lines (Quebec S.S. Division)	..	300, 800	P G	..	..	0.40
Prince Albert 88	VFL	200	Grand Trunk Pacific Development Co.	..	300, 800	P G	..	..	0.40
Prince Arthur 17	VGI	200	Boston & Yarmouth S.S. Co.	..	300, 800	P G	..	..	0.40
Prince George VGK 17	VGK	200	Boston & Yarmouth S.S. Co.	..	300, 800	P G	..	..	0.40
Prince John 80	VFM	200	Grand Trunk Pacific Development Co.	..	300, 800	P G	..	..	0.40
Princess Adelaide 17	VFA	200	Canadian Pacific Railway Co.	..	300, 800	P G	..	..	0.40
Princess Alice VFD 17	VFD	200	Canadian Pacific Railway Co.	..	300, 800	P G	..	..	0.40
Princess Beatrice 17	VFC	200	Canadian Pacific Railway Co.	..	300, 800	P G	..	..	0.40
Princess Charlotte 17	VFE	200	Canadian Pacific Railway Co.	..	300, 800	P G	..	..	0.40
Princess Ena 17	VFI	200	Canadian Pacific Railway Co.	..	300, 800	P G	..	..	0.40
Princess Maquinna 17	VGT	200	Canadian Pacific Railway Co.	..	300, 800	P G	..	..	0.40
Princess Margaret 17	VFB	200	Canadian Pacific Railway Co.	..	300, 800	P G	..	..	0.40
Princess Mary 17	VFI	200	Canadian Pacific Railway Co.	..	300, 800	P G	..	..	0.40
Princess Patricia 80	VGI	200	Canadian Pacific Railway Co.	..	300, 800	P G	..	..	0.40
Princess Royal VFG 17	VGZ	200	Canadian Pacific Railway Co.	..	300, 800	P G	..	..	0.40
Princess Sophia 17	VFG	200	Canadian Pacific Railway Co.	..	300, 800	P G	..	..	0.40
Province 17 119	VFI	200	Canadian Pacific Railway Co.	..	300, 800	P G	..	..	0.40
Quadra 80	VFR	200	Canadian Towing & Wrecking Co.	..	300, 800	P G	..	..	0.40
Rainbow VDB 16	VDM	100	Britannia Mining and Smelting Co., Ltd.	..	300	P G	..	..	0.40
Rapids King 88	VDB	200	Navy	..	300, 800	O	..	..	—
Saltor 80	VVB	200	Canada S.S. Lines, Ltd.	..	300, 800	P G	..	..	0.10
Saronic 17	VVB	200	B.C. Salvage Co.	..	300, 800	P G	..	..	0.40
Seal 17	VGR	200	Northern Navigation Co.	..	300, 800	P G	..	..	0.40
Sheba 16	VGV	200	Halifax Trading & Sealing Co.	..	300, 800	P G	..	..	0.40
Simcoe 18	VDS	200	Government	..	300, 800	O	..	..	—
St. Ignace 17 116	VDB	100	Government	..	300, 800	O	..	..	—
Stanley 16	VGL	125	Canadian Towing & Wrecking Co.	..	300	P G	..	..	0.40
Syracuse 88	VDE	150	Government	..	300, 800	O	..	..	—
	VEF	200	Canada S.S. Lines, Ltd.	..	300, 800	P G	..	..	0.10

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
CANADA AND NEWFOUNDLAND—contd.								
Tues 17 ..	VFK	200	Canadian Pacific Railway Co. ..	300	P G	8 a.m. to 8 p.m.	Francs. 0.40	—
Toronto VED 17 ..	VED	100	Canada S.S. Lines, Ltd. ..	300, 600	P G	N	0.40	—
Turbina VEN 46 ..	VEN	200	Canada S.S. Lines, Ltd. ..	300, 600	P G	N	0.10	—
Venture 40 ..	VGX	200	Union S.S. Co. of B.C. ..	300, 600	P G	N	0.40	—
Yarmouth VGY 17 ..	VGY	100	North America S.S. Corporation	300, 600	P G	N	0.40	—
CHILI								
Aysen 44 ..	CAA	250	Compania Sud-Amer. de Vapores	300, 600	P G	X	0.40	4.00
Baquedano ..	CBQ	—	Navy ..	—	O ..	—	—	—
Blanco ..	CB3	—	Navy ..	—	O ..	—	—	—
Cachapoal 44 ..	CAC	250	Compania Sud-Amer. de Vapores	300, 600	P G	X	0.40	4.00
Casma 100 ..	CBK	—	Government ..	—	O ..	—	—	—
Chacabuco ..	CBA	—	Navy ..	—	O ..	—	—	—
Cochrane CBC ..	CBC	—	Navy ..	—	O ..	—	—	—
Condell ..	CBD	—	Navy ..	—	O ..	—	—	—
Errazuriz ..	CBE	—	Navy ..	—	O ..	—	—	—
Esmeralda ..	CBE	—	Navy ..	—	O ..	—	—	—
Ex-Cochrane ..	CBX	—	Navy ..	—	O ..	—	—	—
Gamero ..	CBG	—	Navy ..	—	O ..	—	—	—
Huasco 44 ..	CAH	250	Compania Sud-Amer. de Vapores	300, 600	P G	X	0.40	4.00
Imperial 44 ..	CAI	250	Compania Sud-Amer. de Vapores	300, 600	P G	X	0.40	4.00
Jarpa ..	CBJ	—	Navy ..	—	O ..	—	—	—
Limari 44 ..	CAL	250	Compania Sud-Amer. de Vapores	300, 600	P G	X	0.40	4.00
Lynch ..	CBY	—	Navy ..	—	O ..	—	—	—
Maipo CBU 100 ..	CBU	—	Government ..	—	O ..	—	—	—
Maipo CAB 44 ..	CAB	250	Compania Sud-Amer. de Vapores	300, 600	P G	X	0.40	4.00
Mapocho 44 ..	CAM	250	Compania Sud-Amer. de Vapores	300, 600	P G	X	0.40	4.00
O'Brien CBN ..	CBN	—	Navy ..	—	O ..	—	—	—
O'Higgins ..	CBH	—	Navy ..	—	O ..	—	—	—
Orella ..	CBO	—	Navy ..	—	O ..	—	—	—
Palena 44 ..	CAP	250	Compania Sud-Amer. de Vapores	300, 600	P G	X	0.40	4.00
Prat ..	CBP	—	Navy ..	—	O ..	—	—	—
Rancagua 100 ..	CBW	—	Government ..	—	O ..	—	—	—
Riquelme ..	CBR	—	Navy ..	—	O ..	—	—	—
Serrano ..	CBS	—	Navy ..	—	O ..	—	—	—
Talcahuano ..	CBT	—	Navy ..	—	O ..	—	—	—
Thomson ..	CBT	—	Navy ..	—	O ..	—	—	—

Line	Ship Name	Company	Port of Origin	Destination	Departure Date	Departure Time	Remarks
1	CHINA	Navy	—	—	—	—	—
2	Chao Ho	Navy	—	—	—	—	—
3	Chu-Chien	Navy	—	—	—	—	—
4	Chu-Kwan	Navy	—	—	—	—	—
5	Chu-Tai	Navy	—	—	—	—	—
6	Chu-Tung	Navy	—	—	—	—	—
7	Chu-Yew	Navy	—	—	—	—	—
8	Chu-Yu	Navy	—	—	—	—	—
9	Fei-Ying	Navy	—	—	—	—	—
10	Foo-An	Navy	—	—	—	—	—
11	Hai-Chew	Navy	—	—	—	—	—
12	Hai-Chi	Navy	—	—	—	—	—
13	Hai-Shen	Navy	—	—	—	—	—
14	Hai-Yung	Navy	—	—	—	—	—
15	Hwah Jah (ex Austria)	Navy	—	—	—	—	—
16	Hwah Ping (ex Bohemia—see Austria)	Navy	—	—	—	—	—
17	Hwah Ting (ex Deltic Rickmers—see Germany)	Navy	—	—	—	—	—
18	Hwah Yih (ex Silesia—see Austria)	Navy	—	—	—	—	—
19	Kiang-Chien	Navy	—	—	—	—	—
20	Kiang-Han	Navy	—	—	—	—	—
21	Kiang-Li	Navy	—	—	—	—	—
22	Kiang-Yuen	Navy	—	—	—	—	—
23	Kien-An	Navy	—	—	—	—	—
24	Kien-Kong	Navy	—	—	—	—	—
25	Kien-Wei	Navy	—	—	—	—	—
26	King-Ching	Navy	—	—	—	—	—
27	Lien-Chin	Navy	—	—	—	—	—
28	Nan-Shen	Navy	—	—	—	—	—
29	Sikiang (ex German vessel—see Germany)	Navy	—	—	—	—	—
30	Tung-An	Navy	—	—	—	—	—
31	Tung-Chi	Navy	—	—	—	—	—
32	Ying-Swei	Navy	—	—	—	—	—
33	Yu-Chang	Navy	—	—	—	—	—
34	Yung-Chion	Navy	—	—	—	—	—
35	Yung-Fung	Navy	—	—	—	—	—
36	Yung-Kien	Navy	—	—	—	—	—
37	Yung-Ts'ih	Navy	—	—	—	—	—
38	CUBA	Compafia Maritima (Munson S.S. Line)	—	—	—	—	—
39	Olinda 76	Compafia Maritima (Munson S.S. Line)	—	—	—	—	—
40	Paloma 76	Compafia Maritima (Munson S.S. Line)	—	—	—	—	—
41	DENMARK	Navy	—	—	—	—	—
42	ezden April	Navy	—	—	—	—	—
43	Absalon	Navy	—	—	—	—	—
44	Aegir OVK	Navy	—	—	—	—	—

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
DENMARK—contd.								
Annam ^{80 91} ..	OZN	160	Det Ostasiatiske Co. ..	300, 800	P ..	X	—	Francs.
Arnold Mærsk ⁸⁰ ..	OZS	200	S.A. Dampskibsselskabet af 1912	300, 600	P ..	X	—	—
Australien OZR ^{80 91} ..	OZS	160	Det Ostasiatiske Co. ..	300, 600	P ..	X	—	—
Beskytteren ..	OUM	—	Navy ..	600	O ²²	X	—	—
C. F. Grove ⁸⁰ ..	OZO	100	Government ..	300, 600	P G	7.30 a.m., 11.30 a.m., 1.30 p.m., 3.30 p.m., 7.30 p.m.	—	—
Chile OZV ^{80 91} ..	OZV	160	Det Ostasiatiske Co. ..	300, 600	P ..	X	—	—
Columbia OZI ^{80 91} ..	OZI	160	Det Ostasiatiske Co. ..	300, 600	P ..	X	—	—
Dannebrog ⁸⁰ ..	OUD	—	Government ..	600	O ²²	X	—	—
Defluen ..	OVD	—	Navy ..	600	O ²²	X	—	—
Dykkeren ..	OZY	—	Navy ..	600	O ²²	X	—	—
Eleonora Mærsk ⁸⁰ ..	OZY	200	Akties. Dampskibsselskab "Svendborg" ..	300, 600	P ..	X	—	—
Falstrin ^{80 91} ..	OZV	200	Det Ostasiatiske Co. ..	300, 600	P ..	X	—	—
Fionia ^{80 91} ..	OZK	250	Det Ostasiatiske Co. ..	300, 600	P ..	X	—	—
Flyvefisker ..	OZF	—	Navy ..	600	O ²²	X	—	—
Frederik VIII. ⁸¹ ..	OZL	200	Det Fortnede Dampskibsselskab ..	300, 600	P G	X	—	4.00
Galathea ..	OVG	—	Navy ..	600	O ²²	X	—	—
Gejser ⁸⁰ ..	OUG	—	Navy ..	600	O ²²	X	—	—
Georg Stage ^{80 88} ..	OZY	100	S.A. Georg Stages Minde ..	300, 600	P ..	X	—	—
Guldruss ⁸⁰ ..	OZU	200	Islands Dampskibsselskab (Eim-skipafølg Islands)	300, 600	P ..	X	—	4.00
Havthuen ..	OVB	—	Navy ..	600	O ²²	X	—	—
Hermanndren ..	OVB	—	Navy ..	600	O ..	X	—	—
H. C. Orsted ^{80 128} ..	OZN	100	Det Store Nordiske Telegrafskab	300, 600	P ..	X	—	—
Heimdal ..	OUI	—	Navy ..	600	O ²²	X	—	—
Hellig Olav ⁸¹ ..	OZB	200	Det Fortnede Dampskibsselskab ..	300, 600	P G	X	—	4.00
Herluf Trolle ..	OUI	—	Navy ..	600	O ²²	X	—	—
Hjælperen ..	OUG	—	Navy ..	600	O ²²	X	—	—
Hvalrossen ..	OVB	—	Navy ..	600	O ²²	X	—	—
Island ⁸¹ ..	OAZ	—	Det Forenede Dampskibsselskab	—	—	X	—	—
Islands Falk ..	OUI	—	Navy ..	600	O ²²	X	—	4.00
Jutlandia ^{80 91} ..	OZG	250	Det Ostasiatiske Co. ..	300, 600	P ..	X	—	—
Lossen ⁸¹ ..	OUL	—	Navy ..	600	O ²²	X	—	—
Løvenørn ⁸¹ ..	OUN	100	Government ..	300, 600	P G	7 a.m., 11 a.m., 3 p.m., 7 p.m.	—	—
Najaden ..	OVN	—	Navy ..	600	O ²²	X	—	—
Neptun ..	OVQ	—	Navy ..	600	O ²²	X	—	—
Nordlys ⁸⁰ ..	OZZ	200	Dampskibsselskabet Norden (Peter ..)	300, 600	P G	X	—	—

[illegible]

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Normal Service.	Ship Charge.	
							Per Word.	Minimum Charge.
DUTCH EAST INDIES—contd.								
Tjikini ¹¹	PLM	100-200	Java, China and Japan Line	300, 800	P G	N	Francs	4.00
Tjilatjap ¹¹	PLP	150	Java, China and Japan Line	300, 800	P G	N	0.40	4.00
Tjileboek ¹¹	PLQ	200	Java, China and Japan Line	300, 800	P G	N	0.40	4.00
Tjiluwong ¹¹	PLN	100-200	Java, China and Japan Line	300, 800	P G	N	0.40	4.00
Tjimanoeck ¹¹	PLI	200	Java, China and Japan Line	300, 800	P G	N	0.40	4.00
Tjipanas ¹¹	PLO	150	Java, China and Japan Line	300, 800	P G	N	0.40	4.00
Tjissak ¹¹	PLR	200	Java, China and Japan Line	300, 800	P G	N	0.40	4.00
Tjissandari ¹¹	PLI	200	Java, China and Japan Line	300, 800	P G	N	0.40	4.00
Tjitaroen ¹¹	PLK	200	Java, China and Japan Line	300, 800	P G	N	0.40	4.00
Van Cloon ¹¹	PMJ	100-150	Koninklijke Paketvaart Maatschappij	300, 450, 800	P G	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Van Overstraten ¹¹	PME	200	Koninklijke Paketvaart Maatschappij	300, 800	P G	N	0.40	4.00
Van Waerwijck ¹¹	PMB	200	Koninklijke Paketvaart Maatschappij	300, 800	P G	N	0.40	4.00
Zeeslang	PLB	60	Navy	300, 800	O A	—	—	—
EGYPT								
Mahrussa ¹	SUA	350	Government	300, 800	P ..	—	—	—
FRANCE								
Abda ¹⁵	FPB	160	Cie de Nav. Paquet	300, 800	P G	—	0.40	—
Abd-el-Kader ¹⁵	FGK	160	Cie Générale Transatlantique	300, 800	P G	—	0.40	—
Afrique ¹⁷	FCR	Day, 270; night, 1,080	Cie Chargeurs Réunis	300, 800	P G	—	0.40	—
Algérie ¹⁰	FVA	270	Société Générale de Transports Maritimes à Vapeur	300, 800	P G	N	0.40	—
Amazon FMA ¹⁷	FMA	Day, 325; night, 650	Cie des Messageries Maritimes	300, 800	P G	6 a.m. to 10 a.m., 5 p.m. to 7 p.m., 9 p.m. to midnight	0.40	—
Amiral Aube	UCJ	350	Navy	300, 800	P G	—	0.05	—
Amiral Charner	UID	350	Navy	300, 800	P G	—	0.05	—
Amiral Laureguiberry ¹⁵	—	—	Cie Chargeurs Réunis	—	—	—	—	—
Amiral Riquault de Genouilly ¹⁵	FCG	160	Cie Chargeurs Réunis	300, 800	P G	—	—	—
Amiral Sallandrouze de Lamor-	FCI	160	Cie Chargeurs Réunis	300, 800	P G	N	0.40	—

Amiral Troude ²⁵	160	Cie Chargeurs Réunis	300, 600	—	0.40
Amiral Villaret de Joyeuse ²⁵	160	Cie Chargeurs Réunis	300, 600	—	0.40
Anatolie ²⁵	160	Cie de Nav. Paquet	300, 600	—	0.40
Ango ²⁵	—	Cie Chargeurs Réunis	—	—	—
Antilles ²⁵	270	Cie Gén. Transatlantique	300	—	0.05
Apache FYP ⁴	80	H. Legru	300	—	0.05
Arbalète	80	Navy	300	—	0.05
Aro	—	Navy	—	—	—
Argenfels (ex German vessel—see GERMANY)	—	—	—	—	—
Argus	50	Navy	300	—	0.05
Armand Béhic ²⁷	325	Cie des Messageries Maritimes	300, 600	—	0.40
Arquebuse	80	Navy	300	—	0.05
Asie ²⁷	160	Cie Chargeurs Réunis	300, 600	—	0.40
Aspiraut-Herber	80	Navy	300	—	0.05
Astrée	35	Soc. Navale Caennaise	300	—	0.40
Atlantique ²⁷	Day, 270; night, 650	Cie des Messageries Maritimes	300, 600	—	0.40
Atlas ULA	50	Navy	300	—	0.05
Atmah ⁴	Day, 540; night, 1,350	Baron E. de Rothschild	300, 600	—	—
Australien FMU ²⁷	325	Cie des Messageries Maritimes	300, 600	—	0.40
Bacchante FYB ⁴	160	Henri Meuter	300, 600	—	—
Baliste	80	Navy	300	—	0.05
Beller	80	Navy	300	—	0.05
Bien Hoa	150	Navy	300, 600	—	0.05
Bisson	80	Navy	300	—	0.05
Bombarde	80	Navy	300	—	0.05
Borda UJK	350	Navy	300	—	0.05
Boudier	80	Navy	300, 600	—	0.05
Bougainville ²⁵	—	Cie Chargeurs Réunis	300	—	—
Bouvines	150	Navy	300, 600	—	0.05
Brennus	350	Navy	300, 600	—	0.05
Britannia FIG ²⁵	160	Cyprien Fabre et Cie	300, 600	—	0.40
Brux ²⁵	350	Navy	300, 600	—	0.05
Buffie	50	Navy	300	—	0.05
Calédonien ²⁷	300	Cie des Messageries Maritimes	300, 600	—	0.40
Californie ²⁵	160	Cie Gén. Transatlantique	300, 600	—	0.40
Canada FIC ²⁵	160	Cyprien Fabre et Cie	300, 600	—	0.40
Captaine Mehl	80	Navy	300	—	0.05
Carabine	80	Navy	300	—	0.05
Carabinier	80	Navy	300	—	0.05
Caravelle ²⁵	160	Cie Gén. Transatlantique	300, 600	—	0.40
Carnot	350	Navy	300, 600	—	0.05
Caroline FTO ²⁵	160	Cie Gén. Transatlantique	300, 600	—	0.40
Carquois	80	Navy	300	—	0.05
Casque	80	Navy	300	—	0.05
Cassard	150	Navy	300, 600	—	0.05
Cassini	150	Navy	300, 600	—	0.05
Catapulte	80	Navy	300	—	0.05
Caudan	50	Navy	300	—	0.05
Cavalier	80	Navy	300	—	0.05

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
FRANCE—contd.								
Centaure	ULC	50	Navy	300	PG	N	France.	France.
Cerbère	UHB	150	Navy	300, 600	PG	N	0.05	—
Ceylan ²⁵	FCC	160	Cie Chargeurs Réunis	300, 600	PG	N	0.40	—
C. Ferd. Laeisz (ex German vessel—50 th GERMANY)	—	—	—	—	—	—	—	—
Champlain ²⁸	—	—	Cie Chargeurs Réunis	—	—	—	—	—
Chaoula ²⁸	FPC	160	Cie de Nav. Paquet	300, 600	PG	N	0.40	—
Charlemagne	UAV	350	Navy	300, 600	PG	N	0.05	—
Charles Martel	UAV	350	Navy	300, 600	PG	N	0.05	—
Charles Roux ^{28 29}	FGR	160	Cie Gén. Transatlantique..	300, 600	PG	N	0.10	—
Charlotte	FHO	Day, 160; night, 325	G. Vidor fils & Co.	300, 600	PG	7 a.m. to 10 a.m., 2 p.m. to 4 p.m., 7 p.m. to 11 p.m.	0.40	—
Chasseur	UFG	80	Navy	300	PG	N	0.05	—
Chicago FTI ²⁵	FTI	160	Cie Gén. Transatlantique..	300, 600	PG	N	0.40	—
Chili ²⁷	FMC	270	Cie des Messageries Maritimes	300, 600	PG	N	0.40	—
Cimetière	UGA	80	Navy	300	PG	N	0.05	—
Claymore	UEJ	80	Navy	300	PG	N	0.05	—
Cognée	UFA	80	Navy	300	PG	N	0.05	—
Commandant Bory	UGD	80	Navy	300	PG	N	0.05	—
Commandant Lucas	UGP	80	Navy	300	PG	N	0.05	—
Commandant Rivière	UGE	80	Navy	300	PG	N	0.05	—
Condé	UCK	350	Navy	300	PG	N	0.05	—
Condorcet	UAG	350	Navy	300, 600	PG	N	0.05	—
Cordillère ²⁷	FMR	300	Cie des Messageries Maritimes	300, 600	PG	N	0.05	—
Corsica ^{28 27}	FRC	160	Cie Marseillaise de Nav. à Vapeur ²⁶	300, 600	PG	N	0.10	—
Corte II. ^{25 27}	FRT	160	Cie Marseillaise de Nav. à Vapeur	300, 600	PG	N	0.10	—
Cosmao	UIR	150	Navy	300, 600	PG	N	0.05	—
Coubet	UAZ	150	Navy	300, 600	PG	N	0.05	—
Coutelas	UES	80	Navy	300	PG	N	0.05	—
Cyclope	ULI	50	Navy	300	PG	N	0.05	—
Danton	UAB	350	Navy	300, 600	PG	N	0.05	—
Dard	UID	80	Navy	300	PG	N	0.05	—
Décidée	UIDX	200	Navy	300, 600	PG	N	0.05	—
Dehorter	UGH	80	Navy	300	PG	N	0.05	—
Démocratie	UAK	350	Navy	300, 600	PG	N	0.05	—
d'Entrecasteaux	UIG	350	Navy	300, 600	PG	N	0.05	—
Desaix	UCR	350	Navy	300, 600	PG	N	0.05	—
Descartes	UIH	150	Navy	300, 600	PG	N	0.05	—

d'Iberville	230	Nav	..	..	..	300, 600	P G	0.05
Diderot	200	Nav	..	..	..	300, 600	P G	0.05
Divona	350	Nav	..	..	..	300, 600	P G	0.05
	Day, 270 ;	Cie de Nav. Sud-Atlantique	..	..	..	300, 600	P G	0.40
	night, 1,080		..	..	..
Djennah	330	Cie des Messageries Maritimes	..	..	..	300, 600	P G	0.40
Doudart de Lagrée	50	Nav	..	..	..	300	P G	0.05
Donkaka	160	Cie de Nav. Paquet	..	..	..	300, 600	P G	0.40
Drôme	150	Government	..	..	..	300, 600	P G	0.05
Duc d'Angmale	160	Cie Gén. Transatlantique	..	..	..	300, 600	P G	0.10
Duc de Bragança	160	Cie Gén. Transatlantique	..	..	..	300, 600	P G	0.10
du Chayla	130	Nav	..	..	..	300, 600	P G	0.05
Duguay Trouin	330	Nav	..	..	..	300, 600	P G	0.05
Dumboua	300	Cie des Messageries Maritimes	..	..	..	300, 600	P G	0.40
Dunois	80	Nav	..	..	..	300	P G	0.05
Dupetit Thouars	330	Nav	..	..	..	300, 600	P G	0.05
Dupleix	330	Cie Chargeurs Réunis	..	..	..	300, 600	P G	0.05
Dupleix UCS	330	Nav	..	..	..	300, 600	P G	0.05
Durandal	80	Nav	..	..	..	300	P G	0.05
Edgar Quinet	330	Nav	..	..	..	300, 600	P G	0.05
Edouard Jaramec	—	Cie Française des Câbles Télégraphiques	..	..	..	300, 600	P	0.40
El Kantara	300	Cie des Messageries Maritimes	..	..	..	300, 600	P G	0.40
Elisabeth-Marie	160	Soc. Gén. d'Armement	..	..	..	300, 600	P G	0.40
Emma	Day, 160 ;	G. Vidor fils & Co.	..	..	..	300, 600	P G	0.40
	night, 325		..	..	..
Enseigne Henry	80	Nav	..	..	..	300	P G	0.05
Epée	80	Nav	..	..	..	300	P G	0.05
Epieu	80	Nav	..	..	..	300	P G	0.05
Equateur	300	Cie des Messageries Maritimes	..	..	..	300, 600	P G	0.40
Ernest Renan	330	Nav	..	..	..	300, 600	P G	0.05
Eros	160	Henri de Rothschild	..	..	..	300	P G	0.05
Escopette	80	Nav	..	..	..	300	P G	0.05
Espagne FAE	160	Cie de Nav. France-Amérique	..	..	..	300	P G	0.40
Espagne FIE	160	Cie Gén. Transatlantique	..	..	..	300, 600	P G	0.40
Estafette	80	Nav	..	..	..	300	P G	0.05
Etendard	50	Nav	..	..	..	300	P G	0.05
Eugène Pénaire	160	Cie Gén. Transatlantique	..	..	..	300	P G	0.10
Europe	Day, 270 ;	Cie Chargeurs Réunis	..	..	..	300, 600	P G	0.40
	night, 1,080		..	..	..
Fanfare	80	Nav	..	..	..	300	P G	0.05
Fanon	80	Nav	..	..	..	300	P G	0.05
Fantassin	80	Nav	..	..	..	300	P G	0.05
Fauconneau	80	Nav	..	..	..	300	P G	0.05
Faulx	80	Nav	..	..	..	300	P G	0.05
Flandre	80	Nav	..	..	..	300	P G	0.05
Flamberge	160	Cie Gén. Transatlantique	..	..	..	300, 600	P G	0.40
Fleuret	80	Nav	..	..	..	300	P G	0.05
Forbin	150	Nav	..	..	..	300, 600	P G	0.05
Fornosa FVO	270	Soc. Gén. de Transports Maritimes à Vapeur	..	..	..	300, 600	P G	0.40
Fondre	330	Nav	..	..	..	300, 600	P G	0.05
Fouché	80	Nav	..	..	..	300	P G	0.05

Jeanne ..	..	..	..	..	..	G. Vidor fils & Co.	..	..	300, 600	P G	..	7 a.m. to 10 a.m., 2 p.m. to 4 p.m., 7 p.m. to 11 p.m.	0.05 0.40
Jeanne Blanche	..	..	..	..	..	Navy	..	..	300	P G	..	8 a.m. to 10 a.m., midday to 2 p.m., 8 p.m. to 10 p.m.	0.05 0.05 0.40
Jeanne d'Arc	..	..	..	..	..	Soc. Gén. d'Armement	..	..	300, 600	P G	..	..	..
Jeanne	..	..	..	..	..	Navy	..	..	300, 600	P G	..	..	..
Jules Ferry	..	..	..	..	..	Navy	..	..	300, 600	P G	..	..	..
Jules Michelet	..	..	..	..	..	Navy	..	..	300, 600	P G	..	..	..
Jurien de la Gravière	..	..	..	..	..	Navy	..	..	300, 600	P G	..	..	..
Justice	..	..	..	..	..	Navy	..	..	300, 600	P G	..	..	..
Kersant	..	..	..	..	..	Navy	..	..	300, 600	P G	..	..	..
La Bretagne ²⁰	..	..	..	..	..	Cie de Nav. Sud-Atlantique	..	..	300, 600	P G	..	..	..
La Gascogne ²⁰	..	..	..	..	..	Cie de Nav. Sud-Atlantique	..	..	300, 600	P G	..	..	..
La Hire	..	..	..	..	..	Navy	..	..	300	P G	..	..	..
La Loire ²⁰	..	..	..	..	..	Cie Nantaise de Nav. à Vapeur	..	..	300, 600	P G	..	..	..
La Lorraine ²⁵	..	..	..	..	..	Cie Gén. Transatlantique	..	..	300, 600	P G	..	..	..
La Marsa ^{25 28}	..	..	..	..	..	Cie de Nav. Mixte	..	..	300, 600	P G	..	..	..
La Navarre ²⁶	..	..	..	..	..	Cie Gén. Transatlantique	..	..	300, 600	P G	..	..	..
Lansquenec	..	..	..	..	..	Navy	..	..	300, 600	P G	..	..	..
La Rosita	..	..	..	..	..	Victor Fourny	..	..	300, 600	P G	..	8 a.m. to 10 a.m., 2 p.m. to 4 p.m.	0.05 0.40
La Savoie ²²	..	..	..	..	..	Cie Gén. Transatlantique	..	..	300, 600	P G	..	..	..
Latauche-Treville	..	..	..	..	..	Navy	..	..	300, 600	P G	..	..	..
La Touraine ²³	..	..	..	..	..	Cie Gén. Transatlantique	..	..	300, 600	P G	..	..	..
Lavosier	..	..	..	..	..	Navy	..	..	300, 600	P G	..	..	..
Le Nord ^{25 20}	..	..	..	..	..	Cie des Chemins de Fer du Nord	..	..	300, 600	P G	..	..	..
Le Pas de Calais ^{25 20}	..	..	..	..	..	Cie des Chemins de Fer du Nord	..	..	300, 600	P G	..	..	..
Liamone ^{25 27}	..	..	..	..	..	Cie Marseillaise de Nav. à Vapeur	..	..	300, 600	P G	..	..	..
Liger ²⁰	..	..	..	..	..	Cie de Nav. Sud-Atlantique	..	..	300, 600	P G	..	..	..
Loiret ..	..	..	..	..	..	Navy	..	..	300, 600	P G	..	..	..
Lotus ²⁷	..	..	..	..	..	Cie des Messageries Maritimes	..	..	300, 600	P G	..	..	..
Louqsor ²⁷	..	..	..	..	..	Cie des Messageries Maritimes	..	..	300, 600	P G	..	..	..
Madonna ²⁵	..	..	..	..	..	Cyprien Fabre et Cie	..	..	300, 600	P G	..	..	..
Magou ..	..	..	..	..	..	Navy	..	..	300	P G	..	..	..
Maite ²⁵	..	..	..	..	..	Cie Chargeurs Réunis	..	..	300, 600	P G	..	..	..
Mameluck	..	..	..	..	..	Navy	..	..	300	P G	..	..	..
Mangini ..	..	..	..	..	..	Navy	..	..	300	P G	..	..	..
Manouba ^{25 29}	..	..	..	..	..	Cie de Nav. Mixte	..	..	300, 600	P G	..	..	..
Marceau ..	..	..	..	..	..	Navy	..	..	300, 600	P G	..	..	..
Maréchal Bugeaud ^{25 23}	..	..	..	..	..	Cie Gén. Transatlantique	..	..	300, 600	P G	..	9 a.m. to midday, 7 p.m. to 11 p.m.	0.05 0.10 0.40
Marguerite Marie	..	..	..	..	..	Joly, Duhamel & Vasse	..	..	300	P G	..	7 a.m. to 10 a.m., 2 p.m. to 4 p.m., 7 p.m. to 11 p.m.	0.05 0.40 0.40
Marie-Rose	..	..	..	..	..	G. Vidor fils & Co...	..	..	300, 600	P G	..	..	..

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type)	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
FRANCE—cont'd.								
Maroc ..	FIJK	200	Joseph Huret	300, 800	P G	X	Francs.	Francs.
Marsaillaise ..	UCM	350	Navy ..	300, 600	P G	N	0.40	—
Martinique ..	FTM	160	Cie Gén. Transatlantique..	300, 600	P G	N	0.05	—
Masséna ..	UAO	350	Navy ..	300, 600	P G	N	0.40	—
Massue ..	UFC	80	Navy ..	300	P G	N	0.05	—
Méhari ..	ULV	50	Navy ..	300	P G	N	0.05	—
Melbourne FNM ⁸⁷ ..	FNM	300	Cie des Messageries Maritimes	300, 800	P G	N	0.05	—
Mexico FFX ²⁵ ..	FTX	160	Cie Gén. Transatlantique..	300, 600	P G	N	0.40	—
Mirabeau ..	—	—	Cie de Nav. Paquet	300, 600	P G	N	0.40	—
Moïna ..	CAC	350	Navy ..	300, 600	P G	N	—	—
Moïse ..	FYM	100	Waché de Roo ..	300, 600	P G	X	0.05	—
Montcalm UCO ..	FGS	160	Cie Gén. Transatlantique..	300, 600	P G	N	0.40	—
Mortier ..	UCO	350	Navy ..	300, 600	P G	N	0.05	—
Mousqueton ..	UEO	80	Navy ..	300	P G	N	0.05	—
—	UDZ	80	Navy ..	300	P G	N	0.05	—
Nera ⁸⁷ ..	FNN	325	Cie des Messageries Maritimes	300, 800	P G	—	0.40	—
Niagara FTB ²⁵ ..	FTB	160	Cie Gén. Transatlantique..	300, 600	P G	N	0.40	—
Notre Dame de la Mer ⁸⁷ ..	FZM	150	Soc. des Œuvres de Mer ..	300, 600	P G	X	0.40	—
Notre-Dame des Dunas ..	HHV	160	Christians and Bourgain..	300, 600	P G	X	0.40	—
Numidia ²⁵ ..	FRN	160	Cie Marsaillaise de Nav. à Vapeur	300, 600	P G	X	0.10	—
Obusier ..	UEM	80	Navy ..	300	P G	N	0.05	—
Océanien ..	FNO	320	Cie des Messageries Maritimes	300, 600	P G	N	0.40	—
Oriflamme ..	UEV	80	Navy ..	300	P G	N	0.05	—
Ouessant ..	FCV	160	Cie Chargeurs Réunis ..	300, 600	P G	N	0.40	—
Oyus ⁸⁷ ..	FMQ	300	Cie des Messageries Maritimes	300, 600	P G	N	0.05	—
Pacifique ⁸⁷ ..	FNW	310	Cie des Messageries Maritimes	300, 600	P G	N	0.40	—
Pampa FVP ⁸⁰ ..	FVP	270	Soc. Gén. de Transports Maritimes à Vapeur	300, 600	P G	N	0.40	—
Parana FVN ⁸⁰ ..	FVN	270	Soc. Gén. de Transports Maritimes à Vapeur	300, 600	P G	N	0.40	—
Patna FFP ⁴¹ ..	FFP	160	Cyprien Fabre et Cie ..	300, 800	P G	N	0.40	—
Patric ..	UAL	350	Navy ..	300, 600	P G	N	0.05	—
Paul Lecat ..	FNP	400	Cie des Messageries Maritimes	300, 600	P G	N	0.40	—
Pérou ..	FTP	160	Cie Gén. Transatlantique..	300, 600	P G	N	0.40	—
Portugaise ..	UDI	80	Navy ..	300	P G	N	0.05	—
Phrygie ..	FPI	160	Cie de Nav. Paquet ..	300, 600	P G	N	0.40	—
Pierrier ..	UEN	80	Navy ..	300	P G	N	0.05	—
Pique ..	UEB	80	Navy ..	300	P G	N	0.40	—
—	UEB	80	Navy ..	300	P G	N	0.05	—

FVL	279	Soc. Gén. de Transports Maritimes à Vapeur	300, 600	P G	N	0.40
Pluton	150	Navy	300, 600	P G	N	0.05
Pognard	80	Navy	300	P G	N	0.05
Polvestien	300	Cie des Messageries Maritimes	300, 600	P G	N	0.05
Portuau	150	Navy	300, 600	P G	N	0.40
Protet	80	Navy	300	P G	N	0.05
Provence FAP ¹⁰	160	Cie de Nav. France-Amérique	300	P G	N	0.05
Puerto Rico ²⁵	160	Cie Gén. Transatlantique	300, 600	P G	N	0.40
Rapière	80	Navy	300	P G	N	0.05
Republique	350	Navy	300, 600	P G	N	0.05
Requin	150	Navy	300, 600	P G	N	0.05
Résolue	215	Pierre Lebandy	300	P G	N	0.05
Rhône	150	Navy	300	P G	N	—
Rechambeau ²⁵	160	Cie Gén. Transatlantique	300, 600	P G	N	0.05
Roma FJR ²⁵	160	Cyprien Fabre et Cie	300, 600	P G	N	0.05
Rosemonde	120	Victor Fourny	300, 600	P G	N	0.40
Rouen ²⁵	160	Stale Railway Administration	300, 600	P G	N	0.40
Sabre	80	Navy	300	P G	N	0.15
Sabretache	80	Navy	300	P G	N	0.05
Sacha	160	Soc. Gén. d'Armement	300	P G	N	0.05
Sagaie	80	Navy	300	P G	N	0.40
Saghalien ²⁷	300	Cie des Messageries Maritimes	300, 600	P G	N	0.05
St. Dominique ²⁵	—	Cie Gén. Transatlantique	—	P G	N	—
St. Laurent ²⁵	160	Cie Gén. Transatlantique	300, 600	P G	N	0.40
St. Louis UAS	350	Navy	300, 600	P G	N	0.05
St. Michel	180	Soc. Navale de l'Ouest	300, 600	P G	N	0.05
Sainte-Jeanne ²⁷	300	Soc. des Guyres de Mer	300, 600	P G	N	0.40
Samara ²⁵	300	Cie de Nav. Sud-Atlantique	300, 600	P G	N	0.40
Samson ULH	50	Navy	300	P G	N	0.40
Sant Anna ²⁵	160	Cyprien Fabre et Cie	300, 600	P G	N	0.05
Sape	80	Navy	300	P G	N	0.40
Sarbacane	80	Navy	300	P G	N	0.05
Sentinelle	80	Navy	300	P G	N	0.05
Sidi-Brahim ^{25 26}	160	Soc. Gén. de Transports Maritimes à Vapeur	300, 600	P G	N	0.05
Spahi	80	Navy	300	P G	N	0.10
Stylet	80	Navy	300	P G	N	0.05
Surocouf	150	Navy	300	P G	N	0.05
Sussex FZX ²⁵	160	Stale Railway Administration	300, 600	P G	N	0.05
Sydney FNY ²⁷	300	Cie des Messageries Maritimes	300, 600	P G	N	0.15
Taillebourg	50	Navy	300	P G	N	0.40
Théodore Mante ^{25 29}	160	Cie de Nav. Mixte	300, 600	P G	N	0.05
Timrad ^{25 28}	160	Cie Gén. Transatlantique	300	P G	N	0.10
Tirailleur	80	Navy	300	P G	N	0.05
Triton	80	Navy	300	P G	N	0.05
Tromblon	80	Navy	300	P G	N	0.05
Vaucuse ²⁵	160	Gouvernement	300	P G	N	0.05
Venezia FJV ²⁵	325	Cyprien Fabre et Cie	300, 600	P G	N	0.40
Venezuela FLW ²⁵	350	Cie Gén. Transatlantique	300, 600	P G	N	0.40
Vergniaud	350	Navy	300, 600	P G	N	0.05
Vérité	350	Navy	300, 600	P G	N	0.05

8 a.m. to 10 a.m.,
2 p.m. to 4 p.m.

6 a.m. to 9 a.m.,
4 p.m. to 7 p.m.

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
FRANCE—contd.								
Victor Hugo ..	UCG	350	Navy ..	300, 600	PG	N	Francs. 0.05	Francs. —
Vigilante ..	UKB	50	Navy ..	300	PG	N	0.05	—
Ville d'Alger ^{25 26} ..	FGQ	160	Cie Gén. Transatlantique..	300, 600	PG	N	0.10	—
Ville de Madrid ^{25 26} ..	FGM	160	Cie Gén. Transatlantique..	300, 600	PG	—	—	—
Ville de Tunis ²⁵ ..	EGT	160	Cie Gén. Transatlantique..	300, 600	PG	—	—	—
Vinh Long ²⁶ ..	UJB	150	Gouvernement ..	300, 600	PG	N	0.05	—
Virginie ²⁵ ..	FIV	160	Cie Gén. Transatlantique..	300, 600	PG	N	0.40	—
Voltaire UAD ..	CAD	350	Navy ..	300, 600	PG	N	0.05	—
Voltaire ..	UFL	80	Navy ..	300	PG	N	0.05	—
Waldceur-Rousseau ..	UCA	350	Navy ..	300, 600	PG	N	0.05	—
Yarra FMY ²⁷ ..	FMY	325	Cie des Messageries Maritimes ..	300, 600	PG	N	0.40	—
Yatagan ..	UDH	80	Navy ..	300	PG	N	0.05	—
GERMANY.								
Adamsturm ²⁸ (seized by American Govt.—see U.S.A.)	DAY	200	D.S. Ges. Hansa ..	300, 600	PG	X	0.40	4.00
Adelaide ²⁸ (now Cunene—see PORTUGAL)	DAE	325	Deutsch-Australische D.S. Ges. ..	300, 600	PG	X	0.10	4.00
Adeline-Hugo Stinnes III ²⁹ ..	DAH	200	Hugo Stinnes ..	300, 600	PG	X	0.40 ²⁹	4.00 ²⁹
Adler ²⁹ ..	DAD	100	D.S. Ges. Argo ..	300, 600	PG	X	0.40 ²⁹	4.00 ²⁹
Admiral ²¹ (now Lourenco Mar-quit ²¹ —see PORTUGAL)	DAL	325	Deutsche Ost-Afrika Line ..	300, 600	PG	X	0.40	4.00
Adolf ²⁹ ..	DAO	60	Geestmünder Herings und Hoch-seefischerie-Aktienges	300, 600	PG	X	0.40	4.00
Adolph Woermann ²¹ ..	DAW	325	Woermann Line ..	300, 600	PG	X	0.40	4.00
Aegir AAE ..	AAE	—	Navy ..	300, 600	PG	X	0.40	4.00
Aenne Riekmers ²³ (seized by British Govt.—see GREAT BRITAIN)	DAM	200	Riekmers, Reismühlen, Koederei und Schiffbau/A.G.	300, 600	O ..	N	0.40 ²³	4.00 ²³
Albany DAK ²⁰ (now Matteo Renato Imbriani—see ITALY)	DAK	325	Deutsch-Australische D.S. Ges. ..	300, 600	PG	X	0.40	4.00
Albatross AAK ..	AAK	—	Navy ..	300, 600	O ..	N	0.40 ²²	4.00 ²²
Albion ²¹ ..	DAB	200	Hamburg-Amerika Line (Atlas Line)	300, 600	PG	10 a.m. to midday, midnight to 2 a.m.	0.25 ²¹	2.50 ²¹
Alda ²⁰ ..	DAJ	325	Roland Line ..	300, 600	PG	X	0.40	4.00

Ship	Station	Company	Class	Speed	Range	Notes
Alexandria ¹ Woermann ²³	325.	Woermann Line	..	..	..	4.00
All-manna ²¹ (seized by American Govt.—see U.S.A.)	200	Hamburg-Amerika Line (Atlas Line)	..	..	..	2.
Alrich ²⁰ (now Patnalyba—see Brazil)	323	Roland Line	..	..	..	4.00
Anasia ²²	200	D.S. Ges. Kosmos	..	..	..	4.00
Amazona AAM	—	Navy	..	..	..	4.00 ³³
Ambrisa ²¹ (now Piero Maroncelli—see ITALY)	200	Hamburg-Amerika Line	..	..	..	4.00
Amerika ²¹ (now America—see U.S.A.)	250	Hamburg-Amerika Line	..	..	..	4.00
Andalusia ²¹ (seized by American Govt.—see U.S.A.)	200	Hamburg-Amerika Line	..	..	..	4.00
Andree Rickmers ²³	200	Rickmers, Reismühlen, Reederei und Schiffbau, A.G.	..	..	..	4.00
Anhalt ²¹	200	Norddeutscher Lloyd	..	..	..	4.00
Annie-Hugo Stünes VI ²⁰	200	Hugo Stünes	..	..	..	4.00 ³³
Antonina ²¹	200	Hamburg-Amerika Line	..	..	..	4.00
Arcadia DXC ²¹ (seized by American Govt.—see U.S.A.)	200	Hamburg-Amerika Line	..	..	..	4.00
Arcona ²⁰	—	Navy	..	..	..	4.00 ³²
Araucario ²⁰	200	D.S. Ges. Hansa	..	..	..	4.00
Argenteis ²⁰ (seized by French Govt.—see FRANCE)	200	D.S. Ges. Hansa	..	..	..	4.00
Armenia ²¹ (seized by American Govt.—see U.S.A.)	200	Hamburg-Amerika Line	..	..	..	4.00
Arsterturm ²⁰	200	D.S. Ges. Hansa	..	..	..	4.00
Artemisia ²¹	100	Hamburg-Amerika Line	..	..	..	4.00
Asgard ²⁰ (now Alma—see Russia)	200	Midgard, Deutsche Seeverkehrs-Aktienges	..	..	..	4.00
Asuncion DAC ²¹ (now Campos—see BRAZIL)	200	Hamburg Süd-Am. D.S. Ges.	..	..	..	4.00
Atto ²⁰	325	Roland Line	..	..	..	4.00
Augsburg	—	Navy	..	..	..	4.00 ³³
Australia DAU ²⁰ (seized by British Govt.—see GREAT BRITAIN)	325	Deutsch-Australische D.S. Ges.	..	..	..	4.00
Arenfels ²⁰ (now Alberto Cavalletto—see ITALY)	200	D.S. Ges. Hansa	..	..	..	4.00
Badenia ²¹	200	Hamburg Amerika Line	..	..	..	4.00
Bahia DBP ²¹	323	Hamburg-Süd-Am. D.S. Ges.	..	..	..	4.00
Bahia Blanca ²¹ (interned in Argentine port)	200	Hamburg-Süd-Am. D.S. Ges.	..	..	..	4.00
Bahia Castillo ²¹	200	Hamburg-Süd-Am. D.S. Ges.	..	..	..	4.00
Bahia Laura ²¹ (now Caxias—see BRAZIL)	200	Hamburg-Süd-Am. D.S. Ges.	..	..	..	4.00

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
GERMANY—contd.								
Barbarossa ²¹ (now Mercury—see U.S.A.)	DKS	200	Norddeutscher-Lloyd	300, 800	P G	N.	Francs. 0.40	Francs. 4.00
Barcelona DBA ²¹ (now Ancona—see ITALY)	DBA	200	Hamburg-Amerika Line	300, 800	P G	N	0.40	4.00
Batavia ²¹ (seized by American Govt.—see U.S.A.)	DDJ	250	Hamburg-Amerika Line	300, 800	P G	N	0.40	4.00
Bavaria ²¹ (seized by American Govt.—see U.S.A.)	DBV	200	Hamburg-Amerika Line	300, 800	P G	N	0.40	4.00
Bayeri ²¹ (now Alessandria—see ITALY)	DQF	200	Hamburg-Amerika Line	300, 800	P G	X	0.40	4.00
Belgia ²¹ (now Huntstrick—see GREAT BRITAIN)	DBY	200	Hamburg-Amerika Line	300, 800	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Belgrano DBN ²¹	DBN	325	Hamburg-Süd-Am. D.S. Ges.	300, 800	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Belgravia ²¹	DEL	200	Hamburg Amerika Line	300, 800	P G	X	0.40	4.00
Beowulf	ABW	—	Navy	300, 800	O	N	0.40	4.00 ²³
Berengar ²⁰	DBE	325	Roland Line	300, 800	P G	X	0.40	4.00 ²³
Berlin ABE	ABE	—	Navy	300, 800	O	N	0.40	4.00 ²³
Berlin DKB ²¹	DKB	250	Norddeutscher-Lloyd	300, 800	P G	N	0.40	4.00
Bernuda ²¹	DQG	200	Hamburg-Amerika Line	300, 800	P G	X	0.40	4.00
Berthold ²⁰	DBD	60	Gesamter Heringe und Hoch-seischerie-Aktien-Ges.	300, 800	P G	6 a.m. to 7 a.m., 6 p.m. to 7 p.m.	0.40	4.00
Bethania ²¹ (now Parisian—see BRITISH W. INDIES)	DQH	200	Hamburg-Amerika Line	300, 800	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Birkenfels ²⁰ (now Polshannon ²¹ —see GREAT BRITAIN)	DBF	325	D.S. Ges. Hansa	300, 800	P G	X	0.40	4.00
Blitz	ABZ	—	Navy	300, 800	O	N	0.40 ²³	4.00 ²³
Blücher ²¹ (now Leopoldina—see BRAZIL)	DDB	250	Hamburg-Amerika Line	300, 800	P G	N	0.40	4.00
Bochum ²⁰ (seized by American Govt.—see U.S.A.)	DOM	325	Deutsch-Australische D.S. Ges.	300, 800	P G	X	0.40	4.00
Bohemia DBJ ²¹ (seized by American Govt.—see U.S.A.)	DBJ	200	Hamburg-Amerika Line	300, 800	P G	X	0.40	4.00
Bosnia ²¹	DBZ	200	Hamburg-Amerika Line	300, 800	P G	N	0.40	4.00
Brandenburg ABD	ABD	—	Navy	300, 800	O	N	0.40 ²³	4.00 ²³
Brandenburg DBG ²¹	DBG	200	Norddeutscher-Lloyd	300, 800	P G	N	0.40	4.00
Brasilia ²¹	DQI	100	Hamburg-Amerika Line	300, 800	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Braunfels ²⁰ (seized by British Govt.—see GREAT BRITAIN)	DBC	200	D.S. Ges.Hansa	300, 800	P G	X	0.40	4.00
Braunschweig	ABG	—	Navy	300, 800	O	N	0.40 ²³	4.00 ²³
Bremen ADN	ABN	—	Navy	300, 800	O	N	0.40 ²³	4.00 ²³

Breslau ³¹ (now Bridgeport—see U.S.A.)	DBU	200	..	Norddeutscher-Lloyd	..	300, 600	P G	..	N	0.40	4.00
Brisbane DBI ³⁰ (now Damao—see PORTUGAL)	DBI	325	..	Deutsch-Australische D.S. Ges.	..	300, 600	P G	..	X	0.40	4.00
Brigavica ³¹ ..	DBQ	200	..	Hamburg-Amerika Line ..	..	300, 600	P G	..	X	0.40	4.00
Bubendey ³¹ ..	DBV	200	..	Hamburg-Amerika Line ..	..	300, 600	P G	..	N	0.12	—
Buenos Aires DBS ³¹ ..	DBS	200	..	Hamburg-Süd-Am. D.S. Ges.	..	300, 600	P G	..	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Bulgaria ³¹ (seized by American Govt.—see U.S.A.)	DDG	250	..	Hamburg-Amerika Line ..	..	300, 600	P G	..	N	0.40	4.00
Bulow ³¹ (now Tras-os-Montes ³¹ —see PORTUGAL)	DBW	325	..	Norddeutscher-Lloyd	..	300, 600	P G	..	N	0.40	4.00
Bürgermeister ³¹ ..	DBM	325	..	Deutsche Ost-Afrika Line	..	300, 600	P G	..	9.30 a.m. to 5.30 p.m., 9.30 p.m. to 1.30 a.m.	0.40	4.00
Camilla Rickmers ³⁰ (seized by American Govt.—see U.S.A.)	DLR	200	..	Rickmers, Reismühlen, Reederei und Schiffbau, A.G.	..	300, 600	P G	..	X	0.40	4.00
Cannstadt ³⁰ (now Bakara—see GREAT BRITAIN)	DTT	325	..	Deutsch-Australische D.S. Ges.	..	300, 600	P G	..	X	0.40	4.00
Cap Atcona ³¹ ..	DCA	325	..	Hamburg Süd-Am. D.S. Ges.	..	300, 600	P G	..	N	0.40	4.00
Cap Blanco ³¹ ..	DCB	325	..	Hamburg Süd-Am. D.S. Ges.	..	300, 600	P G	..	N	0.40	4.00
Cap Finistierre ³¹ ..	DCN	325	..	Hamburg Süd-Am. D.S. Ges.	..	300, 600	P G	..	N	0.40	4.00
Cap Ortegal ³¹ ..	DCO	250	..	Hamburg Süd-Am. D.S. Ges.	..	300, 600	P G	..	N	0.40	4.00
Cap Roca ³¹ (now Itu—see BRAZIL)	DCR	200	..	Hamburg Süd-Am. D.S. Ges.	..	300, 600	P G	..	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Cap Verde ³¹ ..	DCE	200	..	Hamburg Süd-Am. D.S. Ges.	..	300, 600	P G	..	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Cap Vilano ³¹ (now Sobral—see BRAZIL)	DCV	250	..	Hamburg Süd-Am. D.S. Ges.	..	300, 600	P G	..	N	0.40	4.00
Carmen ..	ACR	—	..	Navy ..	..	300, 600	O	..	N	0.40 ³²	4.00 ³²
Cassel ³¹ ..	DCG	200	..	Norddeutscher-Lloyd	..	300, 600	P G	..	N	0.40	4.00
C. Ferri, Laeisz ³¹ (seized by French Govt.—see FRANCE)	DQJ	200	..	Hamburg-Amerika Line ..	..	300, 600	P G	..	X	0.40	4.00
Cheimitz ³¹ ..	DCZ	200	..	Norddeutscher-Lloyd	..	300, 600	P G	..	N	0.40	4.00
Christvan X ³¹ (now Fratelli Bandiera—see ITALY)	DCX	325	..	Hamburg-Amerika Line ..	..	300, 600	P G	..	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Cincinnati DDC ³¹ (now Covington—see U.S.A.)	DDC	250	..	Hamburg-Amerika Line ..	..	300, 600	P G	..	N	0.40	4.00
Clara Blumenfeld ³⁰ ..	DCL	200	..	Pd Blumentfeld ..	..	300, 600	P G	..	X	0.40 ³²	4.00 ³²
Clare-Hugo Stinnes I. ³⁰ ..	DCS	200	..	Hugo Stinnes ..	..	300, 600	P G	..	X	0.40	4.00
Cleveland DDV ³¹ ..	DDV	250	..	Hamburg-Amerika Line ..	..	300, 600	P G	..	N	0.40	4.00
Cobra ³¹ ..	DCD	60	..	Hamburg-Amerika Line ..	..	300, 600	P G	..	N	0.12	—
Coburg ³¹ (now Precone—see BRAZIL)	DCG	200	..	Norddeutscher-Lloyd	..	300, 600	P G	..	N	0.40	4.00
Colmar ³⁰ (now Machico—see PORTUGAL)	DOL	325	..	Deutsch-Australische D.S. Ges.	..	300, 600	P G	..	X	0.40	4.00
Conдор ..	ACN	—	..	Navy ..	..	300, 600	O	..	N	0.40 ³²	4.00 ³²
C-rco-vado DRG ³¹ ..	DRC	250	..	Hamburg-Amerika Line ..	..	300, 600	P G	..	N	0.40	4.00
Cordoba LCK ³¹ ..	DCR	200	..	Hamburg Süd-Am. D.S. Ges.	..	300, 600	P G	..	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Corrientes DOY ³¹ (now Guaru-tuba—see BRAZIL)	DOY	200	..	Hamburg Süd-Am. D.S. Ges.	..	300, 600	P G	..	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Crefeld ³¹ ..	DCT	200	..	Norddeutscher-Lloyd	..	300, 600	P G	..	9.30 a.m. to 5.30 p.m., 9.30 p.m. to 1.30 a.m.	0.40	4.00

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
GERMANY—contd.								
Crostatels ⁸⁰	DOI	200	D.S. Ges. Hansa ..	300, 600	P G	X	Frances.	Frances.
Dania ⁸¹	DDX	200	Hamburg-Amerika Line ..	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Danzig	ADZ	—	Navy	300, 600	O ..	N	0.40 ⁸³	4.00 ⁸³
Deike Rickmers ⁸⁸ (now Hwah Ting—see CHINA)	DIK	200	Rickmers, Reismühlen, und Schiffbau, A.G.	300, 600	P G	N	0.40	4.00
Delphin ADC	ADC	—	Navy	300, 600	O ..	N	0.40 ⁸³	4.00 ⁸³
Derfflinger ADF	ADF	—	Navy	300, 600	O ..	N	0.40 ⁸³	4.00 ⁸³
Derfflinger DER ⁸¹ (now Huntsgrove—see GREAT BRITAIN)	DER	325	Norddeutscher-Lloyd	300, 600	P G	N	0.43	4.00
Destro ⁸¹	DET	200	Hamburg-Städ-Am. D.S. Ges.	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Deutschland ADE	ADE	—	Navy	300, 600	O ..	N	0.40 ⁸³	4.00 ⁸³
Deutschland DDU ⁸⁰ ⁸⁰	DDU	110	Prussian Railway Administration	300, 375, 600	O ⁸⁴ P R ⁸⁵	N	6.18 ⁸⁷	1.80 ⁸⁷
Diedrich ⁸⁰	DID	60	Geestmünder Herings- und Hochseefischerei-Aktienges.	300, 600	P G	6 a.m. to 7 a.m., 6 p.m. to 7 p.m.	0.40	4.00
Dora-Hugo Stinnes XII. ⁸⁰	DOS	200	Hugo Stinnes	300, 600	P G	X	0.40	4.00
Dorothea Rickmers ⁸⁰	DIY	200	Deutsche Levante Linie	300, 600	P G	X	0.40	4.00
Dortmund ⁸¹ (now Irtysh—see Russia)	DQK	200	Hamburg-Amerika Line	300, 600	P G	X	0.40	4.00
Drache	ADA	—	Navy	300, 600	O ..	N	0.40 ⁸³	4.00 ⁸³
Drachenfels ⁸⁰	DCH	100	D.S. Ges. Hansa	300, 600	P G	X	0.40	4.00
Düsseldorf ⁸⁰	DSU	325	Deutsch-Australische D.S. Ges.	300, 600	P G	X	0.40	4.00
Edmund-Hugo Stinnes IV. ⁸⁰	DEH	200	Hugo Stinnes	300, 600	P G	X	0.40 ⁸³	4.00 ⁸³
Edward ⁸⁰	DED	60	Geestmünder Herings- und Hochseefischerei-Aktienges.	300, 600	P G	X	0.40	4.00
Ehrenfels ⁸⁰	DEV	200	D.S. Ges. Hansa	300, 600	P G	X	0.40	4.00
Eisenach ⁸¹ (now Santarem—see BRAZIL)	DEI	200	Norddeutscher-Lloyd	300, 600	P G	N	0.40	4.00
Elisabeth Rickmers ⁸⁰	DRX	200	Rickmers, Reismühlen, und Schiffbau, A.G.	300, 600	P G	X	0.40	4.00
Elkab ⁸¹	DER	325	D.S. Ges. Kosmos	300, 600	P G	9.30 a.m. to 5.30 p.m., 9.30 p.m. to 1.30 a.m.	0.40	4.00
Elsass AEL	AEL	—	Navy	300, 600	O ..	N	0.40 ⁸³	4.00 ⁸³
Elsass DEC ⁸¹ (seized by Anstalt von Paris)	DEC	200	Norddeutscher Lloyd	300, 600	P G	X	0.40	4.00

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Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type.).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
GERMANY—contd.								
Gouverneur Jaeschke ²¹ (seized by American Govt.—see U.S.A.)	DGJ	250	Hamburg-Amerika Line ..	300, 600	P G	10 a.m. to midday, midnight to 2 p.m.	Francs. 0.40	Francs. 4.00
Graf Waldersee ²¹	DDW	200	Hamburg-Amerika Line ..	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Gratada ²¹ (interned in Argentine port)	DQN	100	Hamburg-Amerika Line ..	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Graudenz ..	AGR	—	Navy ..	300, 600	O ..	N	0.40 ²²	4.00 ²²
Greifenfels ²⁰ ..	DGE	200	D.S. (ws. Hansa ..	300, 600	P G	X	0.40 ²²	4.00 ²²
Grete-Hugo Stinnes VIII. ²⁰ ..	DGH	200	Hugo Stinnes ..	300, 600	P G	X	0.40 ²²	4.00 ²²
Grille ..	AGS	—	Navy ..	300, 600	O ..	N	0.40 ²²	4.00 ²²
Grosser Kurfürst AKZ ²¹ ..	AKZ	—	Navy ..	300, 600	O ..	N	0.40 ²²	4.00 ²²
Grosser Kurfürst DKG ²¹ (now Aeolus—see U.S.A.)	DKG	250	Norddeutscher Lloyd ..	300, 600	P G	N	0.40	4.00
Grossherzog Friedrich August ²⁰ ..	DGG	200	Deutscher Schiffsverein ..	300, 600	P G	X	0.40	4.00
Grossherzog von Oldenburg ²⁰ 128	DGO	200	Norddeutsche Seekabelwerke Coy. ..	300, 600	— ²²	X	—	—
Grünwald u. (now General G. W. Goethals—see U.S.A.)	DGR	200	Hamburg-Amerika Line ..	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Gulayba ²¹ (now Porto Santo —see PORTUGAL)	DGY	325	Hamburg-Std-Am. D.S. Ges. ..	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Habsburg, DHG ²¹ ..	DHG	250	Hamburg-Amerika Line ..	300, 600	P G	N	0.40	4.00
Hagen AHA ..	AHA	—	Navy ..	300, 600	O ..	N	0.40 ²²	4.00 ²²
Haimon ²⁰ ..	DHA	325	Roland Line ..	300, 600	P G	N	0.40	4.00
Hamburg AHM ..	AHM	—	Navy ..	300, 600	O ..	N	0.40 ²²	4.00 ²²
Hamburg DDH ²¹ (now Powhatan—see U.S.A.)	DDH	250	Hamburg-Amerika Line ..	300, 600	P G	N	0.40	4.00
Hannover AHV ..	AHV	—	Navy ..	300, 600	O ..	N	0.40 ²²	4.00 ²²
Hannover DHV ²¹ ..	DHV	200	Norddeutscher-Lloyd ..	300, 600	P G	N	0.40	4.00
Hansa AHN ..	AHN	—	Navy ..	300, 600	O ..	N	0.40 ²²	4.00 ²²
Hansa DZH ²¹ ..	DZH	100	Hamburg-Amerika Line ..	300, 600	P G	X	0.40	4.00
Harburg ²⁰ ..	DZG	200	D.S. Ges. Hansa ..	300, 600	P G	X	0.40	4.00
Harbor ²⁰ ..	DHC	325	D.S. Ges. Kosmos ..	300, 600	P G	X	0.40	4.00
Hay ..	AHP	—	Navy ..	300, 600	O ..	N	0.40 ²²	4.00 ²²
Heinburg ²⁰ (now Santo Antao —see PORTUGAL)	DMG	200	D.S. Ges. Hansa ..	300, 600	P G	X	0.40	4.00
Heindall AHD ..	AHD	—	Navy ..	300, 600	O ..	N	0.40 ²²	4.00 ²²
Heinrich-Hugo Stinnes VII. ²⁰ ..	DHH	200	Hugo Stinnes ..	300, 600	P G	X	0.40 ²²	4.00 ²²
Helene Blumenfeld ²⁰ ..	DHR	200	Bld. Blumenfeld ..	300, 600	P G	X	0.40 ²²	4.00 ²²
Helene-Hugo Stinnes XIV. ²⁰ ..	DHJ	200	Hugo Stinnes ..	300, 600	P G	X	0.40 ²²	4.00 ²²

Line No.	Ship Name	Company	Port of Origin	Destination	Departure Date	Departure Time	Days of Week	Remarks
325	DHE	Deutsche-Amerikanische	D.S. Ges. Kosmos	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
325	DHW	Wormann Line	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
200	DHK	Deutsche-Amerikanische	Petro-chem-Ges.	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
—	AHT	Navy	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
200	DHZ	Norddeutscher-Lloyd	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
—	AHE	Navy	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
200	AHT	Navy	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
200	DHI	Hugo Stinnes	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
325	DHT	Deutsch Australische D.S. Ges.	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
325	DHO	Deutsch-Australische D.S. Ges.	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
100	DHM	D.S. Ges. Hansa	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
250	DHN	Hamburg-Amerika Line	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
—	AHO	Government	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
325	DHR	Roland Line	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
200	DZE	Hamburg-Amerika Line	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
325	DHL	Norddeutscher Lloyd	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
200	DHD	D.S. Ges. Hansa	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
200	DIM	D.S. Ges. Hansa	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
100	DIR	Stettiner D.S. Ges. J. F. Braunschweig G. m. b. H.	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
325	DIT	Hamburg-Amerika Line	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
—	AIR	Navy	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
200	DID	Mukard. Deutsche Seeverkehrs-Aktienges.	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
200	DIL	W. Kunstmann	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
80	ALA	Imperial Ministry of Marine	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
325	DIV	Deutsch-Australische D.S. Ges.	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
60	AKS	Navy	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
—	DKQ	Hamburg-Amerika Line	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
—	AKB	Navy	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
—	AKF	Navy	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
—	AKT	Navy	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
—	AKA	Navy	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
250	DDA	Kaiserin Augusta Victoria	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
—	AKG	Kaiser Karl der Grosse	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
—	AKI	Kaiser Wilhelm II. AKI	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	
325	DKM	Norddeutscher-Lloyd	..	..	..	9:30 a.m. to 5:30 p.m., 9:30 p.m. to 1:30 a.m.	..	

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
GERMANY—contd.								
Kaiser Wilhelm der Grosse ..	AKW	—	Navy ..	300, 600	O ..	N	Francs. 0.40 ⁸³	4.00 ⁸³
Kandels ⁸⁰ ..	DKU	200	D.S. Ges. Hansa ..	300, 600	P G	X	0.40	4.00
Kanak DNK ⁴⁸ ..	DNK	325	D.S. Ges. Kosmos ..	300, 600	P G	X	0.40	4.00
Kattenturm ⁸¹ (now Pontida—see ITALY)	DNT	200	D.S. Ges. Hansa ..	300, 600	P G	X	0.40	4.00
Kigoma ⁸¹ ..	DYT	325	Deutsche Ost-Afrika Line ..	300, 600	P G	9.30 a.m. to 5.30 p.m., 9.30 p.m. to 1.30 a.m.	0.40	4.00
Kleist ⁸¹ ..	DST	325	Norddeutscher-Lloyd ..	300, 600	P G	N	0.40	4.00
Köln ⁸¹ (seized by American Govt.—see U.S.A.)	DKC	200	Norddeutscher-Lloyd ..	300, 600	P G	N	0.40	4.00
Komet ⁸⁰ (now Una—see AUSTRALIA)	DKT	80	Government (New Guinea Revenue Service)	300, 600	O ..	X	0.40 ⁸³	4.00 ⁸³
Kommodore ⁴⁸ (now Mormugão—see PORTUGAL)	DOR	325	Deutsche Ost-Afrika Line ..	300, 600	P G	X	0.40	4.00
König AKP ..	AKP	—	Navy ..	300, 600	O ..	N	0.40 ⁸³	4.00 ⁸³
König DKJ ⁸⁰ ..	DKJ	325	Deutsche Ost-Afrika Line ..	300, 600	P G	X	0.40	4.00
König Albert AAL ..	AAL	—	Navy ..	300, 600	O ..	N	0.40 ⁸³	4.00 ⁸³
König Albert DKO ⁸¹ (now Fernando Palasciano—see ITALY)	DKO	200	Norddeutscher-Lloyd ..	300, 600	P G	N	0.40	4.00
König Friedrich August ⁸¹ ..	DFR	250	Hamburg-Amerika Line ..	300, 600	P G	N	0.40	4.00
Königin Luise ⁸¹ ..	DKL	200	Norddeutscher-Lloyd ..	300, 600	P G	N	0.40	4.00
König Wilhelm II. ⁸¹ (now Madawaska—see U.S.A.)	DDK	250	Hamburg-Amerika Line ..	300, 600	P G	N	0.40	4.00
Kraft ..	AKV	—	Navy ..	300, 600	O ..	N	0.40 ⁸³	4.00 ⁸³
Kronprinz Wilhelm ⁸¹ (now Stubben—see U.S.A.)	DKP	250	Norddeutscher-Lloyd ..	300, 600	P G	N	0.40	4.00
Kronprinz ⁸¹ (now Quelimane—see PORTUGAL)	DPZ	325	Deutsche Ost-Afrika Line ..	300, 600	P G	9.30 a.m. to 5.30 p.m., 9.30 p.m. to 1.30 a.m.	0.40	4.00
Kronprinzessin Cecilie DCJ ⁸¹ (now Princess—see GREAT BRITAIN)	DCI	325	Hamburg-Amerika Line ..	300, 600	P G	N	0.40	4.00
Kronprinzessin Cecilie DKA ⁸¹ (now Mount Vernon—see U.S.A.)	DKA	250	Norddeutscher-Lloyd ..	300, 600	P G	N	0.40	4.00
Kybels ⁸⁰ ..	DKY	200	D.S. Ges. Hansa ..	300, 600	P G	X	0.40	4.00
La Plata DLP ⁸¹ ..	DLP	200	Hamburg-Amerika Line ..	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00

— 200	ALS DLB	Lensahn Liebenfels ⁸⁰ (now Houston— see U.S.A.) Lichtenfels ⁸⁰ (now Goa—see PORTUGAL)	Navy D.S. Ges. Hansa ..	300, 800 300, 600	O .. P G	..	N X	0.40 ³³ 4.00
100	DLS	Lilly Rickmers ⁴³ ..	D.S. Ges. Hansa ..	300, 800	P G	..	X	0.40
200	DLY	Lindenfels ⁸⁰ (now Kingsmere —see GREAT BRITAIN)	Rickmers Reismühlen, Reederei und Schiffbau, A.G.	300, 800	P G	..	X	0.40
200	DLI	Loki ⁴³ ..	D.S. Ges. Hansa ..	300, 600	P G	..	X	0.40
200	DLK	Loongmoon ⁸¹ (seized by Ameri- can Govt.—see U.S.A.)	Deutsch-Amerikanische Petrol- eum-Ges. Hamburg-Amerika Line ..	300, 800	P G	..	X	0.40
200	DLN	Lothringen ..	Navy ..	300, 800	P G	..	to a.m. to midday, midnight to 2 a.m.	0.40
— 200	ALO DLQ	Löwenburg ⁸⁰ .. (interned in Argentine port)	D.S. Ges. Hansa ..	300, 800 300, 600	O .. P G	..	N X	0.40 ³³ 0.40
— 325 325	ALK DZC DLW	Libeck ALK .. Lubbeck DZC ⁸⁰ .. Lucie Weermann ³¹ ..	Navy .. Deutsch-Australische D.S. Ges. .. Weermann Line ..	300, 800 300, 600 300, 600	O .. P G P G	..	N X 9.30 a.m. to 5.30 p.m., 9.30 p.m. to 1.30 a.m.	0.40 ³³ 0.40 0.40
325	DLU	Lüneburg ⁸⁰ ..	Deutsch-Australische D.S. Ges. ..	300, 800	P G	..	X	0.40
325	DLO	Lutzow DLO ⁸¹ (now Huntsend —see GREAT BRITAIN)	Norddeutscher Lloyd ..	300, 600	P G	..	X	0.40
200	DLX DMC	Luxor ⁴³ .. Madeleine Rickmers ⁴³ ..	D.S. Ges. Kosmos Rickmers Reismühlen, Reederei und Schiffbau, A.G.	300, 800 300, 600	P G P G	..	X X	0.40 0.40
200 200	DKI DMT	Main ⁸¹ .. Mai Rickmers ⁴⁵ ..	Norddeutscher Lloyd ..	300, 800	P G	..	N	0.40
325	DMM	Manheim ⁸⁰ ..	Rickmers Reismühlen, Reederei und Schiffbau, A.G.	300, 600	P G	..	X	0.40
325	DMD	Mark ⁸¹ (seized by American Govt.—see U.S.A.)	Deutsch-Australische D.S. Ges. ..	300, 600	P G	..	X	0.40
— 200 100	AMF DMU DMQ	Markgraf .. Marksburg ⁸⁰ .. Mecklenburg DMQ ⁸¹ ..	Navy .. D.S. Ges. Hansa .. Hamburg-Amerika Line ..	300, 800 300, 600 300, 600	O .. P G P G	..	N X to a.m. to midday, midnight to 2 a.m.	0.40 ³³ 0.40 0.40
— 325	AME DME	Mecklenburg ⁸² AME Metusa AMD .. Melbourne DME ⁸⁰ (now Boo- nah—see GREAT BRITAIN)	Navy .. D.S. Ges. Hansa .. Deutsch-Australische D.S. Ges. ..	300, 800 300, 600 300, 600	O .. P G P G	..	N N N	0.40 ³³ 0.40 ³³ 0.40
325	DMP	Memphis ⁴³ ..	D.S. Ges. Kosmos ..	300, 800	P G	..	X	0.40
200	DMN	Mera ⁴³ ..	D.S. Ges. Kosmos ..	300, 800	P G	..	X	0.40
200	DMX	Moltke AMT ..	D.S. Ges. Kosmos ..	300, 800	P G	..	X	0.40
— 250	AMT DLM	Moltke AMT .. Moltke DDM ⁸¹ (now Pesaro— see ITALY)	Navy .. Hamburg-Amerika Line ..	300, 800 300, 600	O .. P G	..	N N	0.40 ³³ 0.40
200	DMO	Moltkfels ⁴⁶ (now Kandy—see GREAT BRITAIN)	D.S. Ges. Hansa ..	300, 600	P G	..	X	0.40
100	DMW	Möwe DMW ⁸⁹ ..	D.S. Ges. Argo ..	300, 800	P G	..	8 a.m. to 1 p.m., 3 p.m. to 6 p.m., 8 p.m. to midnight	0.40 0.40

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
GERMANY—contd.								
München	AMU	—	Navy	300, 600	O ..	N	Francs. 0.40 ³³	Francs. 4.00 ³³
Najade ³¹	DNJ	60	Norddeutscher-Lloyd ..	300, 600	P G	10 a.m. to midday, 1 p.m. to 3 p.m.	0.12	—
Nassau	ANA	—	Navy	300, 600	O ..	N	0.40 ³³	4.00 ³³
Nautilus ANL ..	ANL	—	Navy	300, 600	O ..	N	0.40 ³³	4.00 ³³
Neckar ³¹ (seized by American Govt.—see U.S.A.)	DKK	325	Norddeutscher-Lloyd ..	300, 600	P G	N	0.40	4.00
Negada ³¹	DNA	325	D.S. Ges. Kosmos ..	300, 600	P G	9.30 a.m. to 5.30 p.m., 9.30 p.m. to 1.30 a.m.	0.40	4.00
Neidenfels ³⁰ ..	DNS	100	D.S. Ges. Hansa ..	300, 600	P G	X	0.40	4.00
Neuenfels ³⁰ ..	DNV	100	D.S. Ges. Hansa ..	300, 600	P G	X	0.40	4.00
N'caria ³¹ (now Pensacola—see U.S.A.)	DYP	100	Hamburg-Amerika Line ..	300, 600	P G	X	0.40	4.00
Niederwald ³¹ ..	DQR	200	Hamburg-Amerika Line ..	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Niobe ANI	ANI	—	Navy	300, 600	O ..	N	0.40 ³³	4.00 ³³
Nitokris ³¹	DNI	325	D.S. Ges. Kosmos ..	300, 600	P G	9.30 a.m. to 5.30 p.m., 9.30 p.m. to 1.30 a.m.	0.40	4.00
Nixe ³¹	DNX	60	Norddeutscher-Lloyd ..	300, 600	P G	10 a.m. to midday, 1 p.m. to 3 p.m.	0.12	—
Nora-Hugo Stinnes II. ³⁰	DNH	200	Hugo Stinnes ..	300, 600	P G	N	0.40	4.00
Norder	ANR	—	Navy	300, 600	O ..	N	0.40 ³³	4.00 ³³
Normanna DNO ⁴³ ..	DNO	200	W. Kunstmann ..	300, 600	P G	10 a.m. to 11 a.m., 3 p.m. to 4 p.m., 7 p.m. to 8 p.m.	0.40	4.00
Nymphe ANY	ANY	—	Navy	300, 600	O ..	N	0.40 ³³	4.00 ³³
Ockenfels ³⁰ (seized by American Govt.—see U.S.A.)	DOC	200	D.S. Ges. Hansa ..	300, 600	P G	X	0.40	4.00
Odenwald ³¹ (now Newport News—see U.S.A.)	DQS	200	Hamburg-Amerika Line ..	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Odin AOD	AOD	—	Navy	300, 600	O ..	N	0.40 ³³	4.00 ³³
O. J. D. Ahlström ³⁰ (seized by American Govt.—see U.S.A.)	DAR	200	D.S. Ges. Hansa ..	300, 600	P G	X	0.40	4.00
Oldenburg	AOL	—	Navy	300, 600	O ..	N	0.40 ³³	4.00 ³³
Osiris DIS ⁴³	DIS	200	D.S. Ges. Kosmos ..	300, 600	P G	X	0.40	4.00

Otawara ¹	200	DQT	Hamburg-America Line	..	..	300, 600	P	O	..	N	4.00 ³³
Otter	200	AOT	Navy	..	..	300, 600	P	G	..	N	4.00 ³²
Otto-Hugo Stülpnes IX. ¹⁰	200	DOH	Hamburg-America Line	..	..	300, 600	P	G	..	X	4.00 ³²
Pallanza ³¹	200	DDQ	Hamburg-America Line	..	..	300, 600	P	G	..	10 a.m. to midday, midnight to 2 a.m.	4.00
Panther APA	—	APA	Navy	..	..	300, 600	O	..	..	N	4.00 ³²
Patagonia ³¹ (returned in Argentine port)	200	DQU	Hamburg-America Line	..	..	300, 600	P	G	..	10 a.m. to midday, midnight to 2 a.m.	4.00
Patricia ³¹	200	DDP	Hamburg-America Line	..	..	300, 600	P	G	..	N	4.00
Pawnee DPF ⁴⁸	200	DPF	Deutsch-Amerikanische Petroleum Ges.	..	Petro-	300, 600	P	G	..	X	4.00
Pelikan APE	—	APE	Navy	..	..	300, 600	O	..	..	N	4.00 ³³
Pennsylvania DDN ³¹ (seized by American Govt.—see U.S.A.)	200	DDN	Hamburg-America Line	..	..	300, 600	P	G	..	N	4.00
Persepolis ³¹ (now Belluno—see ITALY)	100	DEP	Hamburg-America Line	..	..	300, 600	P	G	..	X	4.00
Persia DYS ³¹ (now Aracaju—see BRAZIL)	100	DYS	Hamburg-America Line	..	..	300, 600	P	G	..	X	4.00
Peter Rickmers ⁴⁸	200	DPM	Rickmers Reinehnen, Reederei und Schiffbau, A.G.	..	..	300, 600	P	G	..	X	4.00
Petropolis ³¹ (now Madeira—see PORTUGAL)	325	DPS	Hamburg-Städ.-Am. D.S. Ges.	..	..	300, 600	P	G	..	10 a.m. to midday, midnight to 2 a.m.	4.00
Pfalz ³¹ (now Boorara—see GREAT BRITAIN)	325	DPA	Norddeutscher-Lloyd	..	..	300, 600	P	G	..	X	4.00
Pfeil ³¹	—	APF	Navy	..	..	300, 600	O	..	..	N	4.00 ³³
Phoenix ³¹ (now Peniche—see PORTUGAL)	100	DOX	Hamburg-America Line	..	..	300, 600	P	G	..	X	4.00
Pisa DPF ³¹ (seized by American Govt.—see U.S.A.)	200	DDF	Hamburg-America Line	..	..	300, 600	P	G	..	N	4.00
Planet ³¹	—	APL	Navy	..	..	300, 600	O	..	..	N	4.00 ³³
Polynesia ³¹	325	DPO	Hamburg-America Line	..	..	300, 600	P	G	..	10 a.m. to midday, midnight to 2 a.m.	4.00
Pomorie DPX ³¹ (now Rappahannock—see U.S.A.)	200	DPX	Norddeutscher-Lloyd	..	..	300, 600	P	G	..	X	4.00
Poseidon ³¹	325	DPY	Government	..	..	300, 600	P	G	..	8 a.m. to 8.30 a.m., 1.15 p.m. to 1.30 p.m., 8 p.m. to 8.30 p.m.	4.00
Posen APO	—	APQ	Navy	..	..	300, 600	O	..	..	N	4.00 ³³
Poseidon DPQ ³¹ (now Belmonte—see BRAZIL)	200	DPQ	Norddeutscher-Lloyd	..	..	300, 600	P	G	..	X	4.00
President ³¹ (seized by American Govt.—see U.S.A.)	200	DPT	Hamburg-America Line	..	..	300, 600	P	G	..	10 a.m. to midday, midnight to 2 a.m.	4.00
President Grant ³¹ (seized by American Govt.—see U.S.A.)	200	DDS	Hamburg-America Line	..	..	300, 600	P	G	..	N	4.00
President Lincoln ³¹ (seized by American Govt.—see U.S.A.)	200	DDI	Hamburg-America Line	..	..	300, 600	P	G	..	N	4.00
Pretoria ³¹	200	DDT	Hamburg-America Line	..	..	300, 600	P	G	..	N	4.00

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
GERMANY—contd.								
Preussen APR	APR	—	Navy	300, 600	O ..	N	Francs.	4.00 ³³
Preussen DPC ^{30 36}	DPC	170	Prussian Railway Administration	300, 375, 600	O .. P R ..	X	0.40 ³³	1.80 ³⁷
Primus ³¹	DPV	200	Hamburg-Amerika Line ..	300, 600	P G ..	X	0.40	4.00
Princess Alice DKZ ³¹ (seized by American Govt.—see U.S.A.)	DKZ	200	Norddeutscher-Lloyd ..	300, 600	P G ..	N	0.40	4.00
Prinz August Wilhelm ³¹ ..	DSB	200	Hamburg - Amerika Line (Atlas Line)	300, 600 ¹	P G ..	10 a.m. to midday, midnight to 2 a.m.	0.25 ³³	2.50 ³³
Prinz Eitel Friedrich DPE ³¹	DPE	325	Norddeutscher-Lloyd ..	300, 600	P G ..	N	0.40	4.00
Prinz Eitel Friedrich DPl ⁴⁰ (seized by Russian Govt.—see Russia)	DPl	200	Neue Dampfer Co. ..	300, 600	P G ..	—	0.25	2.50
Prinz Eitel Friedrich DSI ³¹ (now Baron de Kals—see U.S.A.)	DSI	200	Hamburg-Amerika Line (Atlas Line)	300, 600	P G ..	10 a.m. to midday, midnight to 2 a.m.	0.25 ³³	2.50 ³³
Prinzessin ³¹	DPN	325	Deutsche Ost-Afrika Line ..	300, 600	P G ..	9.30 a.m. to 5.30 p.m., 9.30 p.m. to 1.30 a.m.	0.40	4.00
Prinzessin Heinrich ³¹ ..	DPD	60	Hamburg-Amerika Line ..	300, 600	P G ..	10 a.m. to midday, midnight to 2 a.m.	0.12	—
Prinzessin Sophie Charlotte ³⁰ (seized by Russian Govt.—see Russia)	DPP	200	Neue Dampfer Co. ..	300, 600	P G ..	—	0.25	2.50
Prinzess Irene ³¹ (now Poca-hontas—see U.S.A.)	DKE	200	Norddeutscher-Lloyd ..	300, 600	P G ..	N	0.40	4.00
Prinzess Wilhelm ..	AWL	—	Navy	300, 600	O ..	N	0.40 ³³	4.00 ³³
Prinz Friedrich Wilhelm ³¹ ..	DKF	250	Norddeutscher-Lloyd ..	300, 600	P G ..	N	0.40	4.00
Prinz Heinrich AHR ..	AHR	—	Navy ..	300, 600	O ..	N	0.40 ³³	4.00 ³³
Prinz Heinrich DPB ³¹ (now Porto—see Portugal)	DPlB	325	Norddeutscher-Lloyd ..	300, 600	P G ..	N	0.40	4.00
Prinz Joachim ³¹ (seized by American Govt.—see U.S.A.)	DSP	200	Hamburg-Amerika Line (Atlas Line)	300, 600	P G ..	10 a.m. to midday, midnight to 2 a.m.	0.25 ³³	2.50 ³³
Prinz Ludwig ³¹ ..	DPL	325	Norddeutscher-Lloyd ..	300, 600	P G ..	N	0.40	4.00
Prinz Oskar ³¹ (seized by American Govt.—see U.S.A.)	DDO	200	Hamburg-Amerika Line ..	300, 600	P G ..	N	0.40	4.00
Prinzregent ³¹	DPG	325	Deutsche Ost-Afrika Line ..	300, 600	P G ..	9.30 a.m. to 5.30 p.m., 9.30 p.m. to 1.30 a.m.	0.40	4.00

ALP	200	—	Navy	300, 600	O ..	..	N	0.40 ³³ 0.25 ³³	4.00 ³³ 2.50 ³³
Prinzregent Luitpold ALP	200	—	Hamburg-Amerika Line	300, 600	P G	..	to a.m. to midday,	0.40 ³³	4.00 ³³
Prinz Sigismund ³¹ (now General W. C. Gorgas—see U.S.A.)	325	325	Wormann Line ..	300, 600	P G	..	midnight to 2 a.m.	0.25 ³³	2.50 ³³
Professor Woermann ³¹ (seized by British Govt.—see GREAT BRITAIN)	200	200	Hamburg-Amerika Line ..	300, 600	P G	..	9.30 a.m. to 5.30 p.m., 9.30 p.m. to 1.30 a.m.	0.40	4.00
Prussia ³¹ (now Cabodello—see BRAZIL)	200	200	D.S. Ges. Hansa ..	300, 600	P G	..	X	0.40	4.00
Rabenfels ³⁰ (seized by British Govt.—see GREAT BRITAIN)	200	200	D.S. Ges. Kosmos ..	300, 600	P G	..	X	0.40	4.00
Rames ³¹ ..	325	325	D.S. Ges. Hansa ..	300, 600	P G	..	X	0.40	4.00
Rappentfels ³⁰ (now Divatalawa—see GREAT BRITAIN)	200	200	D.S. Ges. Hansa ..	300, 600	P G	..	X	0.40	4.00
Rauenfels ³⁰ (now Lages—see BRAZIL)	200	200	Stettin Rigaer D.S. Ges. Th. Gribel.	300, 600	P G	..	— ³³	0.25	2.50
Regina ³⁰ (seized by Russian Govt.—see RUSSIA)	200	200	D.S. Ges. Hansa ..	300, 600	P G	..	X	0.40	4.00
Reichenfels ³⁰ (now Polglass Castle—see GREAT BRITAIN)	325	325	Hamburg-Amerika Line ..	300, 600	P G	..	to a.m. to midday,	0.40	4.00
Rhaetia ³¹ (seized by American Govt.—see U.S.A.)	325	325	D.S. Ges. Kosmos ..	300, 600	P G	..	midnight to 2 a.m.	0.40	4.00
Rhakotis ³¹ ..	200	200	Norddeutscher-Lloyd ..	300, 600	P G	..	9.30 a.m. to 5.30 p.m., 9.30 p.m. to 1.30 a.m.	0.40	4.00
Rhein ³¹ (seized by American Govt.—see U.S.A.)	200	200	D.S. Ges. Hansa ..	300, 600	P G	..	X	0.40	4.00
Rheinfels ³⁰ (seized by British Govt.—see GREAT BRITAIN)	200	200	Navy ..	300, 600	O ..	..	N	0.40 ³³	4.00 ³³
Rheinland ARL ..	200	—	Norddeutscher-Lloyd ..	300, 600	P G	..	X	0.40	4.00
Rheinland DRJ ³¹ ..	200	200	Hamburg-Amerika Line ..	300, 600	P G	..	to a.m. to midday,	0.40	4.00
Rhenania DIA ³¹ (now Feltre—see ITALY)	200	200	W. Kunstmann ..	300, 600	P G	..	midnight to 2 a.m.	0.40	4.00
Rhenania DRZ ³¹ ..	325	325	D.S. Ges. Kosmos ..	300, 600	P G	..	to a.m. to 11 a.m., 3 p.m. to 4 p.m., 7 p.m. to 8 p.m.	0.40	4.00
Rhodopis ³¹ ..	325	325	Hamburg-Süd-Am. D.S. Ges.	300, 600	P G	..	9.30 a.m. to 5.30 p.m., 9.30 p.m. to 1.30 a.m.	0.40	4.00
Rio Grande DRR ³¹ (now Benavente—see BRAZIL)	325	325	Hamburg-Süd-Am. D.S. Ges.	300, 600	P G	..	to a.m. to midday,	0.40	4.00
Rio Negro ³¹ ..	325	325	Hamburg-Süd-Am. D.S. Ges.	300, 600	P G	..	midnight to 2 a.m.	0.40	4.00
Rio Pardo ³¹ ..	325	325	Hamburg-Süd-Am. D.S. Ges.	300, 600	P G	..	to a.m. to midday,	0.40	4.00
Roda ³¹ ..	325	325	D.S. Ges. Kosmos ..	300, 600	P G	..	midnight to 2 a.m.	0.40	4.00
Roland DRB ³⁰ ..	75	75	Vereinigte Buggir- und Frachtschiffahrts-Ges.	300, 600	P G	..	9.30 a.m. to 5.30 p.m., 9.30 p.m. to 1.30 a.m.	0.40	4.00
Roland DRV ³⁰ (now Ayuruoca—see BRAZIL)	325	325	Roland Line ..	300, 600	P G	..	X	0.40	4.00

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
GERMANY—cont'd.								
Roon ARO	ARO	—	Navy	300, 600	O ..	N	France, 0.40 ³³	France, 4.00 ³³
Roon DRN ³¹	DRN	325	Norddeutscher-Lloyd	300, 600	P G	N	0.40	4.00
Rotenfels ³¹ (seized by British Govt.—see GREAT BRITAIN)	DRT	200	D.S. Ges. Hansa	300, 600	P G	X	0.40	4.00
Rugia ³¹	DRU	325	Hamburg-Amerika Line	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Rüstringen	ARU	—	Navy	300, 600	O ..	N	0.40 ³³	4.00 ³³
Sabine Rickmers ³¹ (now Nonni —see Russia)	DIB	200	Rickmers Reismühlen, und Schiffbau, A.G.	300, 600	P G	X	0.40	4.00
Sachsen ³¹ (seized by American Govt.—see U.S.A.)	DQX	200	Hamburg-Amerika Line	300, 600	P G	X	0.40	4.00
Sachsenwald ³¹ (now General O. H. Ernst—see U.S.A.)	DQZ	200	Hamburg-Amerika Line	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Sakarakah ³¹	DYD	325	D.S. Ges. Kosmos	300, 600	P G	X	0.40	4.00
Salamanca ³¹ (now Alegrete—see BRAZIL)	DSH	200	Hamburg-Amerika Line	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Salatis ³¹	DYC	325	D.S. Ges. Kosmos	300, 600	P G	X	0.40	4.00
Sambria ³¹ (seized by American Govt.—see U.S.A.)	DYM	100	Hamburg-Amerika Line	300, 600	P G	X	0.40	4.00
San Nicolas ³¹ (now Alfenas—see BRAZIL)	DIC	325	Hamburg-Süd-Am. D.S. Ges.	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Santa Cruz DNZ ³¹	DNZ	200	Hamburg-Süd-Am. D.S. Ges.	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Santa Elena ³¹	DNL	200	Hamburg-Süd-Am. D.S. Ges.	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Santa Fé ³¹	DNN	200	Hamburg-Süd-Am. D.S. Ges.	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Santa Maria DNM ³¹	DNM	200	Hamburg-Süd-Am. D.S. Ges.	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Santa Rita DNR ³¹	DNR	200	Hamburg-Süd-Am. D.S. Ges.	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Santos ³¹ (seized by Brazilian Govt.—see BRAZIL)	DTO	200	Hamburg-Süd-Am. D.S. Ges.	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Sao Paulo DOO ³¹	DOO	325	Hamburg-Süd-Am. D.S. Ges.	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Sardinia DSJ ³¹ (now S. Jorge —see PORTUGAL)	DSJ	200	Hamburg-Amerika Line	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Scandia ³¹	DJN	200	Hamburg-Amerika Line	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00

Ship	DXD	100	Hamburg-America Line	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Schamburg ³¹ (now Horta—see Portugal)	DTX	200	D.S. Ges. Hansa	300, 600	P G	X	0.40	4.00
Schidturn ³⁰	ASN	—	Navy	300, 600	O	N	0.40 ³³	4.00 ³³
Schlesien	DSW	325	Norddeutscher-Lloyd	300, 600	P G	N	0.40	4.00
Schleswig	ASX	—	Navy	300, 600	O	N	0.40 ³²	4.00 ³²
Schleswig-Holstein	DCF	200	D.S. Ges. Hansa	300, 600	P G	X	0.40	4.00
Schnefeld ³⁰ (now Polescat—see GREAT BRITAIN)	DXB	100	D.S. Ges. Hansa	300, 600	P G	X	0.40	4.00
Schönfels ³⁰	ASA	—	Navy	300, 600	O	N	0.40 ³³	4.00 ³³
Schwaben	DSN	100	D.S. Ges. Argo	300, 600	P G	8 a.m. to 1 p.m., 3 p.m. to 6 p.m., 8 p.m. to midnight	0.40 ³²	4.00 ³²
Schwartzburg ³¹ (now Ponta Delgada—see Portugal)	DUG	100	Hamburg-America Line	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Schwarzwald ³¹	DSX	200	Hamburg-America Line	300, 600	P G	10 a.m. to midday, 4 p.m. to 6 p.m.	0.40	4.00
Sebara ⁴³	DYB	325	D.S. Ges. Kosmos	300, 600	P G	X	0.40	4.00
Secundus ^{31, 32}	DUS	100	Hamburg-America Line	300, 600	P G	X	0.40 ³³	4.00 ³³
Seeadler ASE	ASB	—	Navy	300, 600	O	N	0.40	4.00
Seeadler DSE	DSE	60	Norddeutscher-Lloyd	300, 600	O	10 a.m. to midday, 4 p.m. to 6 p.m.	0.40	4.00
Segovia ³¹ (now Crema—see ITALY)	DGV	100	Hamburg-America Line	300, 600	P G	X	0.40	4.00
Serapis ⁴³ (seized by American Govt.—see U.S.A.)	DIP	200	D.S. Ges. Kosmos	300, 600	P G	X	0.40	4.00
Setos ⁴³ (seized by American Govt.—see U.S.A.)	DYF	325	D.S. Ges. Kosmos	300, 600	P G	X	0.40	4.00
Sevilla ³¹ (interned in Argentine port)	DQY	200	Hamburg-America Line	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Seydlitz AST	AST	—	Navy	300, 600	O	N	0.40 ³³	4.00 ³³
Seydlitz DSZ ³¹ (interned in Argentine port)	DSZ	325	Norddeutscher-Lloyd	300, 600	P G	N	0.40	4.00
Siegnied	ASI	—	Navy	300, 600	O	N	0.40 ³³	4.00 ³³
Sierra Cordoba ³¹	DOD	325	Norddeutscher-Lloyd	300, 600	P G	N	0.40	4.00
Sierra Nevada ³¹ (now Bage—see BRAZIL)	DNE	325	Norddeutscher-Lloyd	300, 600	P G	N	0.40	4.00
Sierra Salvada ³¹ (now Avare—see BRAZIL)	DVA	325	Norddeutscher-Lloyd	300, 600	P G	N	0.40	4.00
Sierra Ventana ³¹	DVE	325	Norddeutscher-Lloyd	300, 600	P G	N	0.40	4.00
Siklang ³¹ (seized by Chinese Govt.—see CHINA)	DGS	200	Hamburg-America Line	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Silesia DJP ³¹	DJP	200	Hamburg-America Line	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Silvana ³¹	DAV	60	Hamburg-America Line	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.12	—
Silvia ³¹	DSQ	200	Hamburg-America Line	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Sirius DIU ⁴³	DIU	200	Deutsch - Amerikanische Petroleum Ges.	300, 800	P G	X	0.40	4.00

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
GERMANY—contd.								
Sisak ²⁰ ..	..	325	D.S. Ges. Kosmos	300, 600	P G	X	Francs. 0.40	4.00
Sithonia ²¹ ..	DTU	200	Hamburg-Amerika Line ..	300, 600	P G	X	0.40	4.00
Sleipner ²² ..	ASL	—	Navy ..	300, 600	O ..	N	0.40 ²²	4.00
Solfels ²⁰ ..	DOH	200	D.S. Ges. Hansa ..	300, 600	P G	X	0.40	4.00
Sonnenberg ²⁴ ..	DDH	200	Hermann Kimm ..	300, 600	P G	X	0.40	4.00
Sophie Rickmers ²⁵ (now Ber- telian—see PORTUGAL)	DKA	200	Neederel und Schiffbau, A.G.	300, 600	P G	X	0.40	4.00
Spesia ²⁶ ..	DIE	200	Hamburg-Amerika Line ..	300, 600	P G	X	0.40	4.00
Spitzfels ²⁰ (now Brescia—see ITALY)	DOZ	200	D.S. Ges. Hansa ..	300, 600	P G	..	0.40	4.00
Statensretar Kraetke ²¹ (seized by American Govt.— see U.S.A.)	DTK	200	Hamburg-Amerika Line ..	300, 600	P G	..	0.40	4.00
Steiermark ²¹ (now Canamu —see BRAZIL)	DIS	200	Hamburg-Amerika Line ..	300, 600	P G	X	0.40	4.00
Steigerwald ²¹ ..	DGD	200	Hamburg-Amerika Line ..	300, 600	P G	..	0.40	4.00
Steinturm ²⁰ (now Hunnie— see GREAT BRITAIN)	DUM	200	D.S. Ges. Hansa ..	300, 600	P G	X	0.40	4.00
Stephan ^{20 122} ..	DSC	325	Norddeutsche Seekabelwerke Coy.	300, 600	O ..	X	—	4.00 ²²
Stettin ²² ..	ASY	—	Navy ..	300, 600	P G	N	0.40 ²²	4.00
Stolberg ²⁰ ..	DLG	325	Deutsch-Australische D.S. Ges. ..	300, 600	P G	X	0.40	4.00
Stolzels ²⁰ (now Dongarra— see GREAT BRITAIN)	DOE	200	D.S. Ges. Hansa ..	300, 600	P G	X	0.40	4.00
Straisund ²⁰ ..	ASM	—	Navy ..	300, 600	O ..	N	0.40 ²²	4.00 ²²
Strassburg ²⁰ ..	ASK	—	Navy ..	300, 600	O ..	N	0.40 ²²	4.00 ²²
Sturmfels ²⁰ (now Ferrara— see ITALY)	DUR	200	D.S. Ges. Hansa ..	300, 600	P G	X	0.40	4.00
Stuttgart ²¹ ..	ASZ	—	Navy ..	300, 600	O ..	N	0.40 ²²	4.00 ²²
Stüdmark ²¹ (now Hunsfort —see GREAT BRITAIN)	DdV	100	Hamburg-Amerika Line ..	300, 600	P G	X	0.40	4.00
Suevia ²¹ (seized by American Govt.—see U.S.A.)	DJT	200	Hamburg-Amerika Line ..	300, 600	P G	X	0.40	4.00
Sunitra DUD ²⁰ (now Bar- tinga—see GREAT BRITAIN)	DUD	325	Deutsch-Australische D.S. Ges. ..	300, 600	P G	X	0.40	4.00
Sydney DSY ²⁰ ..	DSY	325	Deutsch-Australische D.S. Ges. ..	300, 600	P G	X	0.40	4.00
Tabor ²¹ (seized by British	DIA	325	Deutsche Ost-Asien Line ..	300, 600	P G	X	0.40	4.00

Tannenfels ⁸⁰ (now Hunstet—see HONG KONG)	100	DTS	D.S. Ges. Hansa ..	..	300, 600	P G	..	X	0.40	4.00
Tasmania ⁸⁰	325	DIB	Deutsch-Australische D.S. Ges.	..	300, 600	P G	..	X	0.40	4.00
Thessalia ⁸¹	345	DIE	Hamburg-Amerika Line ..	..	300, 600	P G	..	to a.m. to midday, midnight to 2 a.m.	0.40	4.00
Thetis ATH	—	ATH	Navy ..	..	300, 600	O ..	..	N	0.40 ³³	4.00 ³³
Thüringen ⁸⁰	—	ATU	Navy ..	..	300, 600	O ..	..	N	0.40 ³³	4.00 ³³
Thuringia ⁸¹	345	DIU	Hamburg-Amerika Line ..	..	300, 600	P G	..	to a.m. to midday, midnight to 2 a.m.	0.40	4.00
Tijuca ⁸¹ (now Baependy—see BRAZIL)	325	DUC	Hamburg-Süd-Am. D.S. Ges.	..	300, 600	P G	..	to a.m. to midday, midnight to 2 a.m.	0.40	4.00
Titanica ⁸⁰	—	ATG	Navy ..	..	300, 600	O ..	..	N	0.40 ³³	4.00 ³³
Tobias ⁸⁰	325	DYX	D.S. Ges. Kosmos ..	..	300, 600	P G	..	X	0.40	4.00
Trautenfels ⁸⁰ (seized by Siamese Govt.—see SIAM)	200	DIR	D.S. Ges. Hansa ..	..	300, 600	P G	..	X	0.40	4.00
Tuoman ⁸¹	325	DMA	Hamburg-Süd-Am. D.S. Ges.	..	300, 600	P G	..	to a.m. to midday, midnight to 2 a.m.	0.40	4.00
Uarda ⁴³	200	DUU	D.S. Ges. Kosmos	..	300, 600	P G	..	X	0.40	4.00
Uckermark ⁸¹ (now Alentejo—see PORTUGAL)	200	DJW	Hamburg-Amerika Line ..	..	300, 600	P G	..	X	0.40	4.00
Uhenfels ⁸⁰	200	DUH	D.S. Ges. Hansa ..	..	300, 600	P G	..	X	0.40	4.00
Ulm ⁸⁰	325	DVM	Deutsch-Australische D.S. Ges.	..	300, 600	P G	..	X	0.40	4.00
Ursula Rickmers ⁴³	200	DUL	Deutsche Levante Linie ..	..	300, 600	P G	..	X	0.40	4.00
Utgard ⁸⁰ (now Umba—see RUSSIA)	200	DUT	Friedrich Fischer ..	..	300, 600	P G	..	X	0.40	4.00
Valencia ⁸¹	200	DVC	Hamburg-Amerika Line ..	..	300, 600	P G	..	to a.m. to midday, midnight to 2 a.m.	0.40	4.00
Valesia ⁸¹ (now Palmares—see BRAZIL)	200	DVL	Hamburg-Amerika Line ..	..	300, 600	P G	..	to a.m. to midday, midnight to 2 a.m.	0.40	4.00
Vaterland ⁸⁰ DVD ⁸¹ (now Livorno—see U.S.A.)	325	DVD	Hamburg-Amerika Line ..	..	300, 600, 1 800	P G	..	N	0.40	4.00
Victoria Luise AVL	—	AVL	Navy ..	..	300, 600	O ..	..	N	0.40 ³³	4.00 ³³
Victoria Luise DDL ⁸¹	325	DDL	Hamburg-Amerika Line ..	..	300, 600	P G	..	N	0.40	4.00
Vineta ⁸⁰	—	AVN	Navy ..	..	300, 600	O ..	..	N	0.40 ³³	4.00 ³³
Virginia DVI ⁸¹	200	DVI	Hamburg-Amerika Line ..	..	300, 600	P G	..	to a.m. to midday, midnight to 2 a.m.	0.40	4.00
Vulkan ⁸⁰	—	AVU	Navy ..	..	300, 600	O ..	..	N	0.40 ³³	4.00 ³³
Wachtfels ⁸⁰	200	DOW	D.S. Ges. Hansa ..	..	300, 600	P G	..	X	0.40	4.00
Wartburg ⁸⁰	200	DWC	D.S. Ges. Hansa ..	..	300, 600	P G	..	X	0.40	4.00
Wartum ⁸⁰ (seized by British Govt.—see GREAT BRITAIN)	200	DWT	D.S. Ges. Hansa ..	..	300, 600	P G	..	X	0.40	4.00
Wasgenwald ⁸¹	200	DWG	Hamburg-Amerika Line ..	..	300, 600	P G	..	to a.m. to midday, midnight to 2 a.m.	0.40	4.00
Werdenfels ⁸⁰ (now Hunstanton—see GREAT BRITAIN)	200	DWF	D.S. Ges. Hansa ..	..	300, 600	P G	..	X	0.40	4.00
Westerwald ⁸¹ (now Lima—see PORTUGAL)	200	DWE	Hamburg-Amerika Line ..	..	300, 600	P G	..	to a.m. to midday, midnight to 2 a.m.	0.25 ³³	2.50 ³³
Westfalen	—	AWA	Navy ..	..	300, 600	O ..	..	N	0.40 ³³	4.00 ³³

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.
							Per Word. Minimum Charge.
GERMANY—contd.							
Westmark ⁸¹	DZB	100	Hamburg-Amerika Line	300, 600	P G	X	Francs. 0.40
Weslin ⁸⁰	AWP	—	Navy	300, 600	O ..	N	0.40 ³³
Wiegand ⁸⁰	DWI	325	Roland Line	300, 600	P G	X	0.40
Wildenfels ⁸⁰ (now Gulgai—see GREAT BRITAIN)	DWL	100	D.S. Ges. Hansa	300, 600	P G	X	0.40
Wilhelms ⁸⁰	DWS	100	Government at Köslin	300, 600	particular correspondence	X	0.40
Willhad ⁸¹ (seized by American Govt.—see U.S.A.)	DWH	200	Norddeutscher-Lloyd	300, 600	P G	N	0.40
Willkommen ⁸¹	DWN	60	Hamburg-Amerika Line	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.12
Windhuk ⁸¹	DWK	325	Hamburg-Amerika Line	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40
Wisnar ⁸⁰	DWR	325	Deutsch-Australische D.S. Ges.	300, 600	P G	X	0.40
Wittekind ⁸¹ (seized by American Govt.—see U.S.A.)	DWD	200	Norddeutscher-Lloyd	300, 600	P G	N	0.40
Wittelsbach	AWI	—	Navy	300, 600	O ..	N	0.40 ³³
Wörth	AWO	—	Navy	300, 600	O ..	N	0.40 ³³
Wotan ⁴⁸ ⁸¹	DWO	200	Deutsch-Amerikanische Petroleum Ges.	300, 600	P G	X	0.40
Württemberg	AWU	—	Navy	300, 600	O ..	N	0.40 ³³
Wurzburg ⁸¹ (now S. Vicente—see PORTUGAL)	DWU	200	Norddeutscher-Lloyd	300, 600	P G	N	0.40
Yorck ⁸¹	DYK	325	Norddeutscher-Lloyd	300, 600	P G	N	0.40
Ypiranga ⁸¹	DYA	250	Hamburg-Amerika Line	300, 600	P G	N	0.40
Zähringen	AZA	—	Navy	300, 600	O ..	N	0.40 ³³
Zieten AZI	AZI	—	Navy	300, 600	O ..	N	0.40 ³³
GREAT BRITAIN							
Abinsi	MVP	00	Elder Dempster	300, 600	P G	—	0.40
Acasia	—	—	Navy	—	O ..	—	—
Achates	—	—	Navy	—	O ..	—	—
Acheron	—	—	Navy	—	O ..	—	—
Achilles	—	—	Navy	—	O ..	—	—
Acorn	—	—	Navy	—	O ..	—	—

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Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
GREAT BRITAIN—contd.								
Appam ⁴⁴	GDJ	250	Elder Dempster	300, 600	P G	X	0.40	—
Aquarius	—	—	Navy	—	O	—	—	—
Aquitania ⁴⁴	MSU	350	Cunard Line	300, 600	P G	N	0.40	—
Arab	—	—	Navy	—	O	—	—	—
Araguaya ⁴⁴	MBG	250	Royal Mail Steam Packet Co.	300, 600	P G	N	0.40	—
Arcturion (ex Scharzfels—see GERMANY)	—	—	—	—	—	—	—	—
Arankola ⁴⁴	GFN	250	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Arawa ⁴⁴	MWE	250	Shaw Savill & Albion Co.	300, 600	P G	X	0.40	—
Archer	—	—	Navy	—	O	—	—	—
Ardeola ⁴⁴	GCJ	250	Yeoward Bros.	300, 600	P G	X	0.40	—
Argonaut	—	—	Navy	—	O	—	—	—
Argyllshire ⁵¹	GTJ	220	Scottish Shire Line	300, 450, 600	P G	9 a.m. to 12.30 p.m., 1 p.m. to 2 p.m., 4 p.m. to 6 p.m., 8 p.m. to 1 a.m.	0.40	—
Ariel	—	—	Navy	—	O	—	—	—
Arlunza ⁴⁴	GFP	250	Royal Mail Steam Packet Co.	300, 600	P G	N	0.40	—
Armadale Castle ⁴⁴	MOG	250	Union Castle	300, 600	P G	N	0.40	—
Aronda ⁴⁴	MAZ	250	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Arracan ⁷⁵	GWO	180	British & Burnese Steam Nav. Co.	300, 600	P G	10 a.m. to midday, 2 p.m. to 4 p.m., 8 p.m. to midnight	0.40	—
Arrino ⁷⁵	GQU	250	Australind S.S. Co.	300, 600	P G	9.15 a.m. to 1 p.m., 4.30 p.m. to midnight	0.40	—
Arrogant	—	—	Navy	—	O	—	—	—
Arun	—	—	Navy	—	O	—	—	—
Arundel ⁸⁰	MDZ	90	L.B. & S.C. Railway Co.	300, 600	P G	N	0.15 ⁸⁰	1.50 ⁸⁰
Arzila ⁴⁴	GFO	150	Royal Mail Steam Packet Co.	300, 600	P G	N	0.40	—
Ascania ⁴⁴	MTU	250	Cunard Line	300, 600	P G	N	0.40	—
Ascanius ⁴⁴	MFV	250	A. Holt & Co.	300, 600	P G	X	0.40	—
Ascot ⁴⁴	MKZ	150	Britann S.S. Co.	300, 600	P G	X	0.40	—
Ashtabula	GKC ⁴⁴	150	Anglo-American Oil Co.	300, 600	P G	X	0.40	—
Asian ⁴⁴	MKL	250	F. Leyland & Co.	300, 600	P G	N	0.40	—
Assaye ⁴⁴	MOO	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	X	0.40	—
Assistance	—	—	Navy	—	O	—	—	—

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
GREAT BRITAIN—contd.								
Benalla "	GBJ	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	X	Francia. 0.40	—
Benbow "	—	—	Navy	—	O	—	—	—
Benefactor "	MOE	250	T. & J. Harrison	300, 600	P G	X	0.40	—
Berlice "	GIF	250	Royal Mail Steam Packet Co.	300, 600	P G	N	0.40	—
Berwick "	—	—	Navy	—	O	—	—	—
Berwick Castle "	GFI	250	Union Castle	300, 600	P G	X	0.40	—
Berwindmoor "	GFK	250	Berwindmoor S.S. Co.	300, 600	P G	X	0.40	—
Berwindvale "	GFR	250	Berwindvale S.S. Co.	300, 600	P G	X	0.40	—
Bharata "	GAD	250	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Birmingham "	—	—	Navy	—	O	—	—	—
Bittern "	—	—	Navy	—	O	—	—	—
Blake "	—	—	Navy	—	O	—	—	—
Blanche "	—	—	Navy	—	O	—	—	—
Blenheim "	—	—	Navy	—	O	—	—	—
Bloemfontein "	GBN	150	Ellerman and Bucknall S.S. Co.	300, 600	P G	X	0.40	—
Blonde "	—	—	Navy	—	O	—	—	—
Bloodhound "	YYI	—	Murray & Crawford	300, 600	P G	—	0.40	—
Boadicea "	—	—	Navy	—	O	—	—	—
Bohemian "	MEL	250	F. Leyland & Co.	300, 600	P G	N	0.40	—
Bolton Castle "	MAQ	150	Lancashire Shipping Co.	300, 600	P G	X	0.40	—
Bonaventure "	—	—	Navy	—	O	—	—	—
Bonetta "	—	—	Navy	—	O	—	—	—
Bonah (ex Melbourne—see GERMANY)	—	—	Navy	—	O	—	—	—
Boorara (ex Pfalz—see GERMANY)	—	—	Navy	—	O	—	—	—
Borda MFQ "	MFQ	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	X	0.40	—
Borderer "	GCL	150	Borderdale Shipping Co.	300, 600	P G	X	0.40	—
Bostonian "	MNT	250	F. Leyland & Co.	300, 600	P G	N	0.40	—
Botanist "	MAP	250	T. & J. Harrison	300, 600	P G	X	0.40	—
Bovic "	GDO	250	White Star Line	300, 600	P G	X	0.40	—
Boyne "	—	—	Navy	—	O	—	—	—
Brannar Castle "	GFU	250	Union Castle	300, 600	P G	N	0.40	—
Bramble "	—	—	Navy	—	O	—	—	—
Braunfels (ex German vessel—see GERMANY)	—	—	Navy	—	O	—	—	—

[illegible]

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
GREAT BRITAIN—contd.								
Chagres ⁴⁴	GCN	250	Elders & Fyffes	300, 600	PG	X	Francs. 0.40	
Chakdara ⁴⁴	MUO	160	British India Steam Nav. Co.	300, 600	PG	X	0.40	
Chakdina ⁴⁴	MZY	160	British India Steam Nav. Co.	300, 600	PG	X	0.40	
Chakla ⁴⁴	MWQ	160	British India Steam Nav. Co.	300, 600	PG	X	0.40	
Chakrata ⁴⁴	GPE	140	British India Steam Nav. Co.	300, 600	PG	X	0.40	
Chaleur ⁴⁴	GMN	250	Royal Mail Steam Packet Co.	300, 600	PG	N	0.40	
Challenger	—	—	Navy	—	O	—	—	
Champion	—	—	Navy	—	O	—	—	
Changuinola ⁴⁴	MPM	200	Elders & Fyffes	300, 600	PG	X	0.40	
Charabydis	—	—	Navy	—	O	—	—	
Chatham	—	—	Navy	—	O	—	—	
Chaudiere ⁴⁴	GDK	250	Royal Mail Steam Packet Co.	300, 600	PG	N	0.40	
Cheerful	—	—	Navy	—	O	—	—	
Chetner ⁷⁶	—	—	Navy	—	O	—	—	
Chetwell	GWK	115	James Nourse, Ltd.	300, 600	PG	X	0.40	
Chevenne GGB ⁴⁴	GGB	150	Anglo-American Oil Co.	300, 600	PG	X	0.40	
Chignecto ⁴⁴	MBV	250	Royal Mail Steam Packet Co.	300, 600	PG	N	0.40	
Chile GGC ⁴⁴	GCG	250	Pacific Steam Nav. Co.	300, 600	PG	N	0.40	
China MMU ⁴⁴	MMU	250	Peninsular & Oriental Steam Nav. Co.	300, 600	PG	X	0.40	
Chindwara ⁴⁴	GAR	140	British India Steam Nav. Co.	300, 600	PG	X	0.40	
Chindwin ⁷⁶	GWG	180	British & Burmese Steam Nav. Co.	300, 600	PG	to a.m. to midday, 2 p.m. to 4 p.m., 8 p.m. to midnight	0.40	
Chinkoa ⁴⁴	MKO	250	British India Steam Nav. Co.	300, 600	PG	X	0.40	
Chiria ⁸⁰	GUV	30	James Bird, London	300, 600	P	X	—	
Christopher	—	—	Navy	—	O	—	—	
Chupra ⁴⁴	GPU	180	British India Steam Nav. Co.	300, 600	PG	X	0.40	
Chyebassa ⁴⁴	MYF	160	British India Steam Nav. Co.	300, 600	PG	X	0.40	
Circassia ⁴⁴	MWY	250	Anchor Line	300, 600	PG	X	0.40	
City of Benares ⁴⁴	GED	250	City Line (G. Smith & Sons)	300, 600	PG	X	0.40	
City of Bombay ⁴⁴	GUJ	150	Hall Line	300, 600	PG	X	0.40	
City of Bristol ⁴⁴	GEC	150	Hall Line	300, 600	PG	X	0.40	
City of Cairo ⁴⁴	YVY	—	Hall Line	300, 600	PG	X	0.40	
City of Calcutta ⁴⁴	GEE	250	City Line (G. Smith & Sons)	300, 600	PG	N	0.40	
City of Chester ⁴⁴	MAG	150	Hall Line	300, 600	PG	X	0.40	
City of Colaba ⁴⁴	—	—	Hall Line	300, 600	PG	X	0.40	

City of	Line	Class	Capacity	Speed	Time	Remarks
City of Dunkirk	GDD	150	300, 600	0.40	..	
City of Durham	GNC	150	300, 600	0.40	..	
City of Edinburgh	GEC	150	300, 600	0.40	..	
City of Exeter	GEU	200	300, 600	0.40	..	
City of Glasgow	GEU	250	300, 600	0.40	..	
City of Karachi	GBW	250	300, 600	0.40	..	
City of Lahore	GEN	250	300, 600	0.40	..	
City of Lincoln	GDP	150	300, 600	0.40	..	
City of London	GEV	250	300, 600	0.40	..	
City of Madras	MCY	150	300, 600	0.40	..	
City of Madrid	MTM	125	300, 600	0.40	..	
City of Marseilles	GEW	250	300, 600	0.40	..	
City of Naples	GEO	150	300, 600	0.40	..	
City of Newcastle	YVU	—	300, 600	0.40	..	
City of Norwich	GVA	150	300, 600	0.40	..	
City of Poona	GBB	250	300, 600	0.40	..	
City of Rangoon	MTP	135	300, 600	0.40	..	
City of Vienna	MSK	150	300, 600	0.40	..	
City of York	GAO	250	300, 600	0.40	..	
Clan Colquhoun	YVA	150	300, 600	0.40	..	
Clan Macrae	GVM	100	300, 600	0.40	..	
Clan Macrae	GVM	100	300, 600	0.40	..	
Clan Sinclair	YVB	160	300, 600	0.40	..	
Clan Urquhart	YVB	160	300, 600	0.40	..	
Clearway	MYH	250	300, 600	0.40	..	
Clon	—	—	—	—	..	
Glory Castle	GGE	250	300, 600	0.40	..	
Cochrane	—	—	—	—	..	
Coekatrice	—	—	—	—	..	
Coconada	GGB	250	300, 600	0.40	..	
Colaba	GGB	170	300, 600	0.40	..	
Collingwood	—	—	—	—	..	
Cohne	—	—	—	—	..	
Colonia MCL	MCL	140	300, 600	0.40	..	
Colossus	—	—	—	—	..	
Comanche	GCG	150	300, 600	0.40	..	
Comet	—	—	—	—	..	
Commonwealth	—	—	—	—	..	
Commonwealth GGH	GGH	250	300, 600	0.40	..	
Comrie Castle	GGI	250	300, 600	0.40	..	
Comus	—	—	—	—	..	
Conqueror	GID	150	300, 600	0.40	..	
Conquest	—	—	—	—	..	
Contest	—	—	—	—	..	
Coeyanna	GBV	—	300, 600	0.40	..	
Corcovado	MIE	250	300, 600	0.40	..	
Cordelia	—	—	—	—	..	
Cornthian	MKN	250	300, 600	0.40	..	
Cornthia	MWT	250	300, 600	0.40	..	
Cornorant	MFJ	140	300, 600	0.40	..	

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
GREAT BRITAIN— <i>contd.</i>								
Cornishman ⁴⁴	GDW	250	..	300, 800	P G	X	Francs. 0.40	Francs. —
Cornwall	..	..	..	..	O	..	..	..
Corsican ⁴⁴	MCN	250	..	300, 600	P G	N	0.40	..
Cossack	..	..	..	..	O	..	..	..
Crane	..	..	..	..	O	..	..	..
Crescent	..	..	..	..	O	..	..	..
Cretic ⁴⁴	MRC	250	..	300, 600	P G	N	0.10	..
Crown of Seville ⁴⁴	MTL	150	..	300, 800	P G	X	0.10	..
Crown of Toledo ⁴⁴	MHV	250	..	300, 800	P G	X	0.40	..
Crusader	..	..	..	..	O	..	..	..
Cufic ⁴⁴	GDR	250	..	300, 800	P G	X	0.40	..
Culra ⁴⁴	GOQ	160	..	300, 600	P G	X	0.40	..
Cumberland	..	..	..	..	O	..	..	..
Custodian ⁴⁴	GCE	250	..	300, 800	P G	X	0.40	..
Cuyahoga ⁴⁴	MYT	140	..	300, 800	P G	X	0.10	..
Cyclops	..	..	..	..	O	..	..	..
Cyclops GTF ⁶⁰	GTF	90	..	300, 450, 800	P G	X	0.40	4.00
Danube ⁴⁴	MBM	250	..	300, 800	P G	N	0.40	..
Darro ⁴⁴	GGJ	250	..	300, 800	P G	N	0.40	..
Dartmouth	..	..	..	..	O	..	..	..
Dee	..	..	..	..	O	..	..	..
Defender	..	..	..	..	O	..	..	..
Defiance	..	..	..	..	O	..	..	..
Delaware GKG ⁴⁴	GKG	150	..	300, 600	P G	X	0.40	..
Delta ⁴⁴	MKG	250	..	300, 800	P G	X	0.40	..
Demerara ⁴⁴	..	..	..	..	P G	..	..	..
Demosthenes ⁴⁴	GGN	250	..	300, 600	P G	N	0.40	..
Denbigh Hall ⁴⁴	MGK	250	..	300, 600	P G	X	0.40	..
Denbighshire ⁴⁴	GOW	150	..	300, 600	P G	X	0.40	..
Denis ⁴⁴	MPG	250	..	300, 800	P G	N	0.40	..
Denis ⁴⁴	MDE	250	..	300, 800	P G	X	0.40	..
Derbyshire ⁴⁴	MYB	250	..	300, 600	P G	X	0.40	..
Derwent	..	..	..	..	O	..	..	..
Desado ⁴⁴	GGL	250	..	300, 600	P G	N	0.40	..
Desna ⁴⁴	GGM	250	..	300, 800	P G	N	0.40	..
Devanha ⁴⁴	MOU	250	..	300, 800	P G	X	0.40	..
Devona ⁴⁴	GRD	120	..	..	P G	..	0.40	..

[illegible]

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.
							Per Word. Minimum Charge.
GREAT BRITAIN—contd.							
El Cordobes ⁴⁴	MHO	250	British & Argentine Steam Nav. Co.	300, 600	P G	X	Francs. 0.40 Francs. —
Electra ^{40 112}	MEE	140	Eastern Telegraph Co.	300, 450, 600	P	—	0.40
Elephanta ⁴⁴	GGU	250	British India Steam Nav. Co.	300, 600	P	X	0.40
Ellenga ⁴⁴	GGV	250	British India Steam Nav. Co.	300, 600	P G	X	0.40
Eljora ⁴⁴	GGW	250	British India Steam Nav. Co.	300, 600	P G	X	0.40
Elmina ⁴⁴	MZI	250	Elder Dempster	300, 600	P G	X	0.40
El Paraguay ⁴⁴	GGY	250	Houlder Line	300, 600	P G	X	0.40
El Uruguayo ⁴⁴	GGZ	250	British & Argentine Steam Nav. Co.	300, 600	P G	X	0.40
Elysia ⁴⁴	MRH	250	Anchor Line	300, 600	P G	X	0.40
Emperor of India ⁴⁴	GUI	50	South Eastern & Chatham Railway	300, 600	O	N	0.15 ¹⁰ 1.50 ⁵⁰
Empress of Britain ⁴⁴	MPB	250	Canadian Pac. Ry. Ocean Lines	300, 600	P G	N	0.40
Enchantress ⁴⁴	—	—	Navy	—	O	—	—
Endeavour	—	—	Navy	—	O	—	—
Endygon	—	—	Navy	—	O	—	—
Engadine ⁸⁰	GUK	50	South Eastern & Chatham Railway	300, 600	P G	N	0.15
Engineer ⁴⁴	MFO	250	T. & J. Harrison	300, 600	P G	X	0.40
Erinpora ⁴⁴	MVJ	250	British India Steam Nav. Co.	300, 600	P G	X	0.40
Erzberg Franz Ferdinand (ex Austrian vessel — see AUSTRIA)	—	—	—	—	—	—	—
Escalona ⁴⁴	GPZ	150	British & Chilean S.S. Co.	300, 600	P G	X	0.40
Esp égle	—	—	Navy	—	O	N	—
Essequibo ⁴⁴	MTK	210	Royal Mail Steam Packet Co.	300, 600	P G	—	0.40
Essex ⁴⁴	—	—	Navy	—	O	—	—
Essex GXE ⁸⁰	GXE	300	Federal Steam Nav. Co.	300, 600	P G	—	0.40
Etonian ⁴⁴	MFD	250	F. Leyland & Co.	300, 600	P G	—	0.40
Ettrick ⁴⁴	MKT	150	Navy	—	O	X	0.40
Euphon ⁴⁴	MSE	250	Euphon S.S. Co.	300, 600	P G	X	0.40
Euripides ⁴⁴	—	—	Abrdeen Line (G. Thompson & Co.)	300, 600	P G	X	0.40
Euryalus GCZ ⁴⁴	GCZ	180	British India Steam Nav. Co.	—	O	—	—

9 a.m. to 12.30 p.m.,
1 p.m. to 2 p.m.,
4 p.m. to 6 p.m.,
8 p.m. to 1 a.m.

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
GREAT BRITAIN—contd.								
Glenetive 41	N	0.40	—
Glegorm Castle 44	..	250	Rio Cape Line, Ltd. (Furness, Withy & Co., Ltd.)	300, 800	P G	..	0.40	—
Gleniffer 44	..	250	Union Castle ..	300, 800	P G	..	0.40	—
Glenloch 78	..	200	Glen Line ..	300, 800	P G	X	0.40	—
Glenishel 44	..	120	Glen Line ..	300, 800	P ..	X	—	—
..	..	150	Rio Cape Line, Ltd. (Furness, Withy & Co., Ltd.)	300, 800	P G	..	0.40	—
Glory	—	Navy ..	—	O ..	..	—	—
Gloucester	—	Navy ..	—	O ..	..	—	—
Gloucester Castle 44	..	250	Union Castle ..	300, 800	P G	..	0.40	—
Gloucestershire 44	..	250	Bibby Bros. & Co. ..	300, 800	P G	X	0.40	—
Goldfinch	—	Navy ..	—	O ..	..	—	—
Goorkha 44	..	250	Union Castle ..	300, 800	P G	..	0.40	—
Coshawk	—	Navy ..	—	O ..	..	—	—
Gracchus 44	..	180	British India Steam Nav. Co. ..	300, 800	P G	X	0.40	—
Grafton	—	Navy ..	—	O ..	..	—	—
Granplan 44	..	250	Allan Line ..	300, 800	P G	..	0.40	—
Grampus	—	Navy ..	—	O ..	..	—	—
Grantully Castle 44	..	250	Union Castle ..	300, 800	P G	..	0.40	—
Grasshopper	—	Navy ..	—	O ..	..	—	—
Great City 44	..	250	St. Just S.S. Co. (W. R. Smith & Son)	300, 800	P G	X	0.40	—
Greenore 44	..	250	London & North-Western Railway Co. ..	300, 800	P G	..	0.05	0.50
Greyhound	—	Navy ..	—	O ..	..	—	—
Grifflon	—	Navy ..	—	O ..	..	—	—
Grive 80	..	90	General Steam Nav. Co., Ltd. ..	300, 800	P G	X	0.40	—
Guatemala 44	..	250	Pacific Steam Nav. Co. ..	300, 800	P G	N	0.40	—
Guldford Castle 44	..	250	Union Castle ..	300, 800	P G	N	0.40	—
Gujarat 44	..	250	A. Weir & Co. ..	300, 800	P G	N	0.40	—
Halcyon	—	Navy ..	—	O ..	..	—	—
Hannibal	—	Navy ..	—	O ..	..	—	—
Hantonia 44	..	250	London & South-Western Railway	300, 800	P G	N	0.15	1.50
Hardy	—	Navy ..	—	O	—	—
Harpy	—	Navy ..	—	O	—	—
Harrier	—	Navy ..	—	O	—	—

Hearty
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Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
GREAT BRITAIN—contd.							Francs.	Francs.
Huntscraft (ex Südmark—see GERMANY)	—	—	—	—	—	—	—	—
Huntsend (ex Lutzow—see GERMANY)	—	—	—	—	—	—	—	—
Huntsgreen (ex Deufflinger—see GERMANY)	—	—	—	—	—	—	—	—
Huntspill " (ex Koorber—see AUSTRIA)	—	—	—	—	—	—	—	—
Hunstrick (ex Belgia—see GERMANY)	—	—	—	—	—	—	—	—
Hurunui "	GCQ	250	New Zealand Shipping Co.	300, 800	PG	X	0.40	—
Hussar	—	—	Navy	—	O	—	—	—
Hyacinth	—	250	British & South American Steam Nav. Co. (R. P. Houston & Co.)	300, 800	PG	X	0.40	—
Hyacinthus "	GJG	250	British & South American Steam Nav. Co. (R. P. Houston & Co.)	300, 800	PG	X	0.40	—
Hydaspes "	GJH	250	Navy	—	O	—	—	—
Hydra "	GEF	180	British India Steam Nav. Co.	300, 800	PG	X	0.40	—
Hymettus "	GJI	250	British & South American Steam Nav. Co. (R. P. Houston & Co.)	300, 800	PG	X	0.40	—
Hypatia "	—	—	—	—	—	—	—	—
Ibex "	MSC	120	Great Western Railway Co.	300, 800	PG	N	0.05	0.50
Idaho GJJ "	GJJ	250	Ellerman's Wilson Line	300, 800	PG	8 a.m. to 1 p.m., 2 p.m. to 5 p.m., 6 p.m. to 10 p.m.	0.40	—
Illustrious	—	—	Navy	—	O	—	—	—
Impicable	—	—	Navy	—	O	—	—	—
Inanda "	MID	250	T. & J. Harrison	300, 800	PG	N	0.40	—
I ca "	MIF	250	Pacific Steam Navigation Co.	300, 800	PG	9 a.m. to 11 a.m., 8 p.m. to 2 a.m.	0.40	—
Inconstant	—	—	Navy	—	O	—	—	—
Indian "	MHB	250	F. Leyland & Co.	300, 800	PG	N	0.40	—
Indomitable	—	—	Navy	—	O	—	—	—
Indore "	GMI	250	Elder Dempster & Co.	300, 800	PG	X	0.40	—
Inflexible	—	—	Navy	—	O	—	—	—
Inhome "	GDV	250	T. & J. Harrison	300, 800	PG	N	0.40	—
Inkosi "	MIK	250	T. & J. Harrison	300, 800	PG	N	0.40	—
Inlabi "	MIP	250	T. & J. Harrison	300, 800	PG	N	0.40	—

Inventor ⁴⁴	MVY	T. & J. Harrison	300, 800	P G	N	0.40
Invicta ⁶⁰	GUL	South Eastern & Chatham Railway	300, 800	P G	N	0.15
Ionian ⁴⁴	MN	Allan Line ..	300, 800	P G	N	0.40
Ionic ⁴⁴	MW1	White Star Line ..	300, 800	P G	X	0.40
Iphigenia	MNI	Navy	—	O ..	—	—
Iris ⁶⁰ 188	GJK	Pacific Cable Board	—	P G	—	0.40
Irishman ⁴⁴	MEI	Dominion Line	300, 800	O	X	0.40
Iron Duke	MEI	Navy	300, 800	P G	X	0.40
Iroquois MEI ⁴⁴	IS	Anglo-American Oil Co.,	300, 800	O	—	—
Isis	GAP	Navy	300, 800	P G	X	0.40
Isis GAP ⁴⁴	GFB	Peninsular & Oriental Steam Nav.	300, 800	P G	—	—
Ismaïla ⁴⁴	MAR	Co.	300, 800	P G	—	—
Italia MAR ⁴⁴	GFD	British India Steam Nav. Co.	300, 800	P G	X	0.40
Itchen	GRZ	Anchor Line ..	300, 800	O	N	0.40
Itola ⁴⁴	GGA	Navy	—	P G	—	—
Itiria ⁴⁴	GRZ	British India Steam Nav. Co.	300, 800	P G	X	0.40
Ixion ⁶⁰	GJL	A. Holt & Co. ..	300, 450, 800	P G	X	0.40
Jabberwock ⁶⁰ 81	GNN	H. Merton, London	150, 300	P ..	—	—
Jackal	GIUB	Navy	—	O ..	—	—
Janus ⁴⁴	MEF	British India Steam Nav. Co.	300, 800	P G	X	0.40
Jed	GJL	Navy	—	O ..	—	—
John Pender ⁶⁰ 128	—	Eastern Telegraph Co.	300, 450, 800	P G	—	0.40
Junin ⁴⁴	—	Pacific Steam Nav. Co.	300, 800	P G	9 a.m. to 11 a.m., 8 p.m. to 2 a.m.	0.40
June ⁴⁴	—	Navy	—	O ..	—	—
Jupiter	—	Navy	—	O ..	—	—
Kabinga ⁴⁴	GEL	Ellerman & Bucknall S.S. Co.	300, 800	P G	X	0.40
Kakua ⁴⁴	MRT	Ellerman & Bucknall S.S. Co.	300, 800	P G	X	0.40
Kaikoura ⁷⁹	MRS	New Zealand Shipping Co.	300, 800	P G	X	0.40
Katsar-I-Hind ⁴⁴	MSI	Peninsular & Oriental Steam Nav. Co.	300, 800	P G	X	0.40
Kale	GBV	Navy	—	O ..	—	—
Kalamo ⁴⁴	MNL	Ellerman & Bucknall S.S. Co.	300, 800	P G	X	0.40
Kanawha MNL ⁴⁴	MAB	Furness Withy & Co.	300, 800	P G	X	0.40
Kandahar ⁴⁴	—	Ellerman & Bucknall S.S. Co.	300, 800	P G	X	0.40
Kandy (ex Moltkefels--see GERMANY)	—	—	—	—	—	—
Kangaroo	MRW	Navy	—	O ..	—	—
Kansas MRW ⁴⁴	MSB	Ellerman & Bucknall S.S. Co.	300, 800	P G	X	0.40
Karanca ⁴⁴	MTF	Shaw Savill & Albion Co.	300, 800	P G	X	0.40
Karnala	GNS	Peninsular & Oriental Steam Nav. Co.	300, 800	P G	X	0.40
Karroo ⁴⁴	GBP	Ellerman & Bucknall S.S. Co.	300, 800	P G	X	0.40
Kasama ⁴⁴	YVL	Ellerman & Bucknall S.S. Co.	300, 800	P G	X	0.40
Kashgar ⁴⁴	—	Peninsular & Oriental Steam Nav. Co.	300, 800	P G	—	—
Kashmir ⁴⁴	GRU	Peninsular & Oriental Steam Nav. Co.	300, 800	P G	—	0.40
Katharine Park ⁶⁰	—	Park S.S. Co. ..	—	—	—	—

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
GREAT BRITAIN—contd.								
Kathiawar "	GEM	250	A. Weir & Co.	300, 600	P G	N	0.40	—
Kathlamba "	GLF	150	Ellerman and Bucknall S.S. Co.	300, 600	P G	X	0.40	—
Katuna "	GEH	150	Ellerman and Bucknall S.S. Co.	300, 600	P G	X	0.40	—
Kazembe "	GVO	150	Ellerman and Bucknall S.S. Co.	300, 600	P G	X	0.40	—
Keelung Castle "	MFP	150	Ellerman and Bucknall S.S. Co.	300, 600	P G	X	0.40	—
Kenilworth "	MQF	250	Union Castle	300, 600	P G	N	0.40	—
Kennet "	—	—	Navy	—	O ..	—	—	—
Kent "	—	—	Navy	—	O ..	—	—	—
Kentucky GDN "	GDN	150	Ellerman and Bucknall S.S. Co.	300, 600	P G	X	0.40	—
Kenuta "	GJO	250	Pacific Steam Nav. Co.	300, 600	P G	9 a.m. to 11 a.m., 8 p.m. to 2 a.m.	0.40	—
Khiva "	MGZ	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	X	0.40	—
Khyber "	MCE	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	X	0.40	—
Kia Ora "	GJP	250	Shaw Savill & Albion Co.	300, 600	P G	X	0.40	—
Kildonan Castle "	MQK	250	Union Castle	300, 600	P G	N	0.40	—
Kinfauns Castle "	MQL	250	Union Castle	300, 600	P G	N	0.40	—
King Alfred "	—	—	Navy	—	O ..	—	—	—
King George V. "	—	—	Navy	—	O ..	—	—	—
King Orry "	MPE	100	Isle of Man Steam Packet Co.	300, 600	P G	N	0.05	0.50
Kingsmere (ex Lindenfels—see GERMANY)	—	—	—	—	—	—	—	—
Kingtonian "	MHM	250	F. Leyland & Co.	300, 600	P G	N	0.40	—
Kinsha "	—	—	Navy	—	O ..	—	—	—
Knight Companion "	GKS	250	A. Holt & Co.	300, 600	P G	X	0.40	—
Knight of the Garter "	MSQ	250	A. Holt & Co.	300, 600	P G	X	0.40	—
Knight Templar "	GKT	250	A. Holt & Co.	300, 600	P G	X	0.40	—
Korana "	GKY	150	Ellerman and Bucknall S.S. Co.	300, 600	P G	X	0.40	—
Kumara "	MFG	250	Shaw Savill & Albion Co.	300, 600	P G	X	0.40	—
Kumeric "	GJQ	250	Andrew Weir & Co.	300, 600	P G	X	0.40	—
Lackawanna GJV "	GJV	150	Anglo-American Oil Co.	300, 600	P G	X	0.40	—
Lady Brassey 80 114	GQS	90	Dover Harbour Board	150, 300	P ..	X	—	—
Lady Crundall 80 114	GQR	90	Dover Harbour Board	150, 300	P ..	X	—	—
Laertes "	—	—	Navy	—	O ..	—	—	—
Laforey "	—	—	Navy	—	O ..	—	—	—

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
GREAT BRITAIN— <i>contd.</i>								
Lydiard..	—	—	Navy	—	O..	—	—	—
Lyra ..	—	—	Navy	—	O..	—	—	—
Lysander ..	—	—	Navy	—	O..	—	—	—
Macedonia MML ⁴⁴	MML	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	X	0.40	—
Mackay-Bennett ^{60 133}	MMB	250	Commercial Cable Co.	300, 600	P..	X	—	—
Madras ⁴⁴	MSH	250	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Magdalena ⁴⁴	GUC	250	Royal Mail Steam Packet Co.	300, 600	P G	N	0.40	—
Magellan MHH ⁴⁴	MIH	250	Pacific Steam Navigation Co.	300, 600	P G	9 a.m. to 11 a.m., 8 p.m. to 2 a.m.	0.40	—
Magnet MEH ^{80 133}	MEH	140	Eastern Extension Australasia & China Telegraph Co.	300, 600	P..	—	0.40	—
Magnificent ..	—	—	Navy	—	O..	—	—	—
Mahanada ⁷⁵	GVJ	130	T. & J. Brocklebank	300, 600	P G	X	—	—
Maidan ⁷⁵	GVN	130	T. & J. Brocklebank	300, 600	P G	X	—	—
Maidstone ..	—	—	Navy	—	O..	—	—	—
Maine ⁷⁵	—	—	Navy	—	O..	—	—	—
Malakuta ⁷⁵	GVJ	130	T. & J. Brocklebank	300, 600	P G	X	—	—
Malta ⁴⁴	GKD	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	X	0.40	—
Malwa ⁴⁴	MMD	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	X	0.40	—
Manari ⁴⁴	GKE	250	Shaw Savill & Albion Co.	300, 600	P G	X	0.40	—
Manchester City ⁴⁴	GRH	250	Manchester Liners	300, 600	P G	7 a.m. to 11 p.m.	0.40	—
Manchester Corporation ⁴⁴	YVB	140	Manchester Liners	300, 600	P G	—	0.40	—
Mandalay ⁷⁵	GWP	180	British and Burmese Steam Nav. Co.	300, 600	P G	10 a.m. to midday, 2 p.m. to 4 p.m., 8 p.m. to midnight	0.40	—
Manhattan ⁴⁴	GKK	250	Atlantic Transport Line	300, 600	P G	N	0.40	—
Manitou MNM ⁴⁴	MNM	250	Atlantic Transport Line	300, 600	O..	N	0.40	—
Manly ..	—	—	Navy	—	P G	—	0.40	—
Manora ⁴⁴	GIT	250	British India Steam Nav. Co.	300, 600	P G	X	—	—
Manstead ..	—	—	Navy	—	O..	X	—	—
Mantua ⁴⁴	MME	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	—	0.40 ⁴⁰	—
Manxman GPS ⁸⁰	GPS	150	Midland Railway Co.	300, 400, 600	P G	N	0.05	0.50

Mammoth ⁴⁴	250	MGJ	Aberdeen Line (G. Thompson & Co.)	300, 600	P G	..	8 a.m. to 1 p.m., 2 p.m. to 5 p.m., 6 p.m. to 10 p.m.	X	0.40
Marengo ⁴⁴	250	GKJ	Ellerman's Wilson Line ..	300, 600	P G	..	..	—	0.40
Marlborough	—	MMR	Navy	—	O ..	..	..	X	0.40
Marnora ⁴⁴	250	—	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	..	..	—	0.40
Mars	—	—	Navy	—	O ..	..	..	—	0.40
Marlaban ⁷⁸	140	GWC	British and Burnese Steam Nav. Co.	300, 600	P G	..	..	—	0.40
Martin ..	—	—	Navy	—	O ..	..	..	—	0.40
Maryland ⁴⁴	250	MBW	Atlantic Transport Line ..	300, 600	P G	..	..	X	0.40
Massilia ⁴⁴	250	MHQ	Anchor Line ..	300, 600	P G	..	..	X	0.40
Mastiff ..	—	—	Navy	—	O ..	..	..	—	0.40
Matatua ⁴⁴	250	GKL	Shaw Savill & Albion Co.	300, 600	P G	..	..	X	0.40
Matheless ..	—	—	Navy	—	O ..	..	..	—	0.40
Matiana ⁴⁴	200	MYZ	British India Steam Nav. Co. ..	300, 600	P G	..	..	X	0.40
Matina ⁴⁴	150	MLT	Elders & Fyffes ..	300, 600	P G	..	..	X	0.40
Matopo ⁴⁴	150	MAM	Ellerman and Bucknall S.S. Co. ..	300, 600	P G	..	..	X	0.40
Matura ⁴⁴	250	GVD	Trinidad Shipping & Trading Co.	300, 600	P G	..	..	N	0.40
Mauretania ⁴⁴	250	MGA	Cunard Line	110, 300, 600	P G	..	..	N	0.40
Mayaro ⁴⁴	250	MFR	Trinidad Shipping & Trading Co.	300, 600	P G	..	..	N	0.40
Medic ⁴⁴	250	MKK	White Star Line ..	300, 600	P G	..	..	X	0.40
Megantic ⁴⁴	250	MZC	White Star Line ..	300, 600	P G	..	..	N	0.40
Mekong ⁷⁸	270	GSV	V. Morton-Jackson, Clonmel, Ireland	300, 450, 600	P ..	..	..	—	—
Melania ⁴⁴	250	MPP	Anglo-Saxon Petroleum Co.	300, 600	P G	..	..	X	0.40
Menominee ⁴⁴	250	MNE	Atlantic Transport Line ..	300, 600	O ..	..	..	X	0.40
Mentor ..	—	—	Navy	—	O ..	..	..	—	—
Mercedes ..	—	—	Navy	—	O ..	..	..	—	—
Merkara ⁴⁴	250	GMV	British India Steam Nav. Co.	300, 600	P G	..	..	X	0.40
Mernaia ..	—	—	Navy	—	O ..	..	..	—	—
Mesaba ⁴⁴	250	MMV	Atlantic Transport Line ..	300, 600	P G	..	..	N	0.40
Meteor ..	—	—	Navy	—	O ..	..	..	—	—
Mexico MWG ⁴⁴	250	MWG	Pacific Steam Nav. Co. ..	300, 600	P G	..	..	N	0.40
Michael ⁷⁸	225	GWV	Booth S.S. Co. ..	300, 600	P G	..	..	X	0.40
Michigan GKM ⁴⁴	250	GKM	Atlantic Transport Line ..	300, 600	P G	..	..	N	0.40
Midge ..	—	—	Navy	—	O ..	..	..	—	—
Milne ..	—	—	Navy	—	O ..	..	..	—	—
Miltiades ⁴⁴	250	MGP	Aberdeen Line (G. Thompson & Co.)	300, 600	P G	..	..	X	0.40
Milwaukee MLF ⁴⁴	150	MLF	Canadian Pac. Rly. Ocean Lines ..	300, 600	P G	..	..	X	0.40
Minerva ..	—	—	Navy	—	O ..	..	..	—	—
Minia ^{80 118}	150	GUQ	Anglo-American Telegraph Co. ..	300, 600	P ..	..	..	X	—
Minnie de Larrinaga ⁴⁴	250	MLA	Miguel de Larrinaga S.S. Co. ..	300, 600	P G	..	..	X	0.40
Minos ..	—	—	Navy	—	O ..	..	..	—	—
..	—	—	Navy	—	O ..	..	..	—	—

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Normal Service.	Ship Charge.	
							Per Word.	Minimum Charge.
GREAT BRITAIN—contd.								
Miranda	Navy	—	O	—	—	—
Mississippi 44	..	220	Canadian Pac. Rly. Ocean Lines..	300, 800	P G	N	—	—
Missouri 44	..	180	Atlantic Transport Line ..	300, 800	P G	—	0.40	—
MLG 44	..	250	Anglo-Saxon Petroleum Co. ..	300, 800	P G	X	—	—
Mitra 44	..	150	Anglo-Saxon Petroleum Co. ..	—	P G	—	0.40	—
Mohawk	..	—	Navy	—	O	—	—	—
Moldavia 44	..	250	Peninsular & Oriental Steam Nav. Co.	300, 800	P G	X	—	—
Monarch	..	—	Navy	—	O	—	—	—
Monarch GTS 44 113	..	100	H.M. Postmaster General	300	O	—	—	—
Monmouth 44	..	150	Canadian Pac. Rly. Ocean Lines..	300, 800	P G	X	—	—
Monmouthshire 44	..	250	Royal Mail Steam Packet Co. ..	300, 800	P G	N	—	—
Montfort 44	..	150	Canadian Pac. Rly. Ocean Lines..	300, 800	P G	X	—	—
Moorhen	..	—	Navy	—	O	—	—	—
Moorish Prince 44	..	—	Prince Line	300, 800	P G	—	0.40	—
Morea 44	..	250	Peninsular & Oriental Steam Nav. Co.	300, 800	P G	X	—	—
Morris	..	—	Navy	—	O	—	—	—
Morvada 44	..	200	British India Steam Nav. Co.	300, 800	P G	X	—	—
Mosquito	..	—	Navy	—	O	—	0.40	—
Motagua 44	..	250	Elders & Fyffes ..	300, 800	P G	X	—	—
Moy	..	—	Navy	—	O	—	—	—
Moyune 44	..	—	A. Holt & Co.	300, 800	P G	—	—	—
Munster 44	..	140	City of Dublin Steam Packet Co.	300, 800	P G	N	0.05	0.50
Murray 44	..	—	Navy	—	O	—	—	—
Musican 44	..	250	T. & J. Harrison ..	300, 800	P G	X	—	—
Mutlah 44	..	150	James Nourse, Ltd. ..	300, 800	P G	X	—	—
Myngs	..	—	Navy	—	O	—	0.40	—
Myrmidon	..	—	Navy	—	O	—	—	—
Nagoya 44	..	250	Peninsular & Oriental Steam Nav. Co.	300, 800	P G	X	—	—
Naiad	..	—	Navy	—	O	—	—	—
Nanerie 44	..	250	Andrew Weir & Co. ..	300, 800	P G	N	—	—
Nankin 44	..	250	Peninsular & Oriental Steam Nav. Co.	300, 800	P G	X	—	—
Navahoe MEN 24 44	..	150	Anglo-American Oil Co. ..	300, 800	P G	X	—	—

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
GREAT BRITAIN—cont'd.								
Orma " "	GNV	160	British India Steam Nav. Co.	300, 800	P G	X	Francs.	ncs.
Oronsa " "	MJI	250	Pacific Steam Navigation Co.	300, 800	P G	N	0.40	—
Orotas " "	MOZ	250	Orient Steam Nav. Co.	300, 800	P G	X	0.40	—
Orotava " "	GUD	250	Royal Mail Steam Packet Co.	300, 800	P G	N	0.40	—
Orsova " "	MOF	250	Orient Steam Nav. Co.	300, 800	P G	X	0.40	—
Ortega " "	MJK	250	Pacific Steam Navigation Co.	300, 800	P G	N	0.40	—
Orthia " "	YVT	—	Donaldson Bros.	300, 800	P G	X	0.40	—
Oruba " "	GUE	250	Royal Mail Steam Packet Co.	300, 800	P G	N	0.40	—
Orvieto " "	MOJ	250	Orient Steam Nav. Co.	300, 800	P G	X	0.40	—
Orwell " "	—	—	Navy	—	O	X	—	—
Osiris GAQ " "	GAQ	250	Peninsular & Oriental Steam Nav. Co.	300, 800	P G	X	0.40	—
Osprey " "	—	—	Navy	—	O	—	—	—
Osterley " "	MOY	250	Orient Steam Nav. Co.	300, 800	P G	X	0.40	—
Otranto " "	MOD	250	Orient Steam Nav. Co.	300, 800	P G	X	0.40	—
Ottawa " "	MIV	150	Anglo-American Oil Co.	300, 800	P G	X	0.40	—
Ouse " "	—	—	Navy	—	O	—	—	—
Owl " "	—	—	Navy	—	O	—	—	—
Oxfordshire " "	MVE	250	Bibby Bros. & Co.	300, 800	P G	X	0.40	—
Oxonian " "	MHR	250	F. Leyland & Co.	300, 800	P G	N	0.40	—
Ozardia " "	GNZ	140	British India Steam Nav. Co.	300, 800	P G	X	0.40	—
Pactolus " "	—	—	Navy	—	O	—	—	—
Pacmare " "	MLY	150	Elders & Fyries	300, 800	P G	X	0.40	—
Pakeha " "	GLG	250	Shaw Savill & Albion Co.	300, 800	P G	X	0.40	—
Falerno MIL " "	MIL	250	Peninsular & Oriental Steam Nav. Co.	300, 800	P G	X	0.40	—
Palma " "	MKD	250	Peninsular & Oriental Steam Nav. Co.	300, 800	P G	X	0.40	—
Panama MWB " "	MWB	250	Pacific Steam Nav. Co.	300, 800	P G	N	0.40	—
Pancras " "	MDI	250	Booth S.S. Co.	300, 800	P G	X	0.40	—
Pannonia " "	MNA	250	Guard Line	300, 800	P G	N	0.40	—
Panther " "	—	—	Navy	—	O	—	—	—
Paparoa " "	MHY	250	New Zealand S.S. Co.	300, 800	P G	X	0.40	—
Paragon " "	—	—	Navy	—	O	—	—	—
Parana GLK " "	GLK	150	Royal Mail Steam Packet Co.	300, 800	P G	N	0.40	—

Pardo ⁴⁴ ..	GLL	150	Royal Mail Steam Packet Co. ..	300, 600	P G	..	N	0.40	1.50
Paris GLC ⁴¹ ..	GLC	120	L.B. & S.C. Railway Co. ..	300, 600	P G	..	N	0.15	..
Patella ⁴⁴ ..	MZO	150	Anglo-Saxon Petroleum Co. ..	—	P G	..	N	0.40	..
Pathan ⁴⁴ ..	MPV	150	Mogul S.S. Co. (Gellatly, Hankey & Co.)	300, 600	P G	..	X	0.40	..
Patia ⁴⁴ ..	MVV	250	Elders & Fyffes ..	300, 600	P G	..	X	0.40	..
Patrician ⁴⁴ ..	MIR	250	T. & J. Harrison ..	300, 800	P G	..	X	0.40	..
Patrol	MEM	140	Navy ..	300, 800	O ..	..	—	0.40	..
Patrol MEM ^{no 128} ..	MEM	140	Eastern Extension Australasia & China Tel. Co.	300, 800	P ..	..	—	0.40	..
Patuca ⁴⁴ ..	GDB	250	Elders & Fyffes ..	300, 600	P G	..	X	0.40	..
Pelorus ..	MUT	170	Royal Mail Steam Packet Co.	300, 800	O ..	..	N	0.40	..
Pembrokeshire ⁴⁴ ..	MUT	170	Navy ..	300, 800	O ..	..	—	0.40	..
Penclope ..	MUT	170	Navy ..	300, 800	O ..	..	—	0.40	..
Penseus ..	MQC	250	White Star Line ..	300, 800	P G	..	X	0.40	..
Persic ⁴⁴ ..	GLN	250	Pacific Steam Nav. Co. ..	300, 800	P G	..	N	0.40	..
Peru GLN ⁴⁴ ..	GLN	250	Navy ..	—	O ..	..	—	—	..
Petrel ..	—	—	Navy ..	—	O ..	..	—	—	..
Petroleum ..	—	—	Navy ..	—	O ..	..	—	—	..
Phaeton ..	—	—	Navy ..	—	O ..	..	—	—	..
Philomel ..	—	—	Navy ..	—	O ..	..	—	—	..
Phonix ..	—	—	Navy ..	—	O ..	..	—	—	..
Fincher ..	—	—	Navy ..	—	O ..	..	—	—	..
Plassy ⁴⁴ ..	MNJ	250	Peninsular & Oriental Steam Nav. Co.	300, 800	P G	..	N	0.40	..
Polaric ⁴⁴ ..	GCY	250	Andrew Weir & Co. ..	300, 800	P G	..	N	0.40	..
Polscear (ex Schneefels—see GERMANY)	—	—	—	—	—	..	—	—	..
Polglass Castle (ex Reichentels—see GERMANY)	—	—	—	—	—	..	—	—	..
Politician ⁴⁴ ..	MVZ	180	T. & J. Harrison ..	300, 800	P G	..	X	0.40	..
Polshannon (ex Birkenfels—see GERMANY)	—	—	—	—	—	..	—	—	..
Pomeranian ⁴⁴ ..	GLO	250	Allan Line ..	300, 600	P G	..	N	0.40	..
Pomone ..	—	—	Navy ..	300, 600	O ..	..	—	—	..
Poona ⁴⁴ ..	MSO	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	..	X	0.40	..
Porpoise ..	—	—	Navy ..	—	O ..	..	—	—	..
Port Albany ⁴⁰ ..	GWI	260	Commonwealth and Dom. Line ..	300, 800	P G	..	X	0.40	..
Port Lincoln ⁴⁰ ..	GTZ	260	Commonwealth and Dom. Line ..	300, 800	P G	..	N	0.40	..
Port Macquarie ⁴⁰ ..	GSB	260	Commonwealth and Dom. Line ..	300, 800	P G	..	N	0.40	..
Portuguese Prince ⁴⁴ ..	GRS	—	Prince Line ..	—	P G	..	—	—	..
Potomac GLQ ⁴⁴ ..	GLQ	150	Anglo-American Oil Co. ..	300, 600	P G	..	X	0.40	..
Potosi ⁴⁴ ..	MII	250	Pacific Steam Navigation Co.	300, 600	P G	..	9 a.m. to 11 a.m., 8 p.m. to 2 a.m.	0.40	..
Pretorian ⁴⁴ ..	MFN	250	Allan Line ..	300, 800	P G	..	N	0.40	..
Prince George ..	—	—	Navy ..	—	O ..	..	—	—	..
Prince George GLR ⁴⁰ ..	GLR	150	Grand Trunk Pacific Development Co.	300, 600	P G	..	N	0.40	..
Prince of Wales ..	—	—	Navy ..	—	O ..	..	—	—	..
Prince Rupert ⁴⁰ ..	GLS	150	Grand Trunk Pacific Development Co.	300, 600	P G	..	N	0.40	..

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
GREAT BRITAIN—cont'd.								
Princess (ex Kronprinzessin Cecilie DCI—see GERMANY)	—	—	—	—	—	—	Francs.	Francs.
Princess Royal. ⁸⁸	MCM	250	Navy	300, 600	O ..	—	—	—
Princess Victoria	—	—	Canadian Pacific Railway Co.	—	P G	N	0.40 ⁸⁸	4.00 ⁸⁸
Professor Woermann (ex German vessel—see GERMANY)	—	—	—	—	—	—	—	—
Proserpine	—	—	—	—	—	—	—	—
Protésilau ⁸⁰	GSC	90	Navy	300, 450, 600	O ..	—	—	—
Psyche ..	—	—	A. Holt & Co.	—	P G	X	0.40	4.00
Pyramus	—	—	Navy	—	O ..	—	—	—
Quail ..	—	—	—	—	—	—	—	—
Queda ⁴⁴	GOA	140	Navy	300, 600	O ..	X	0.40	—
Queen ..	—	—	British India Steam Nav. Co.	—	P G	—	—	—
Queen Elizabeth	—	—	Navy	—	O ..	—	—	—
Querimba ⁴⁴	GOB	140	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Quernmore ⁴⁴	GYT	250	Johnston Line (Furness, Withy & Co.)	300, 600	P G	X	0.40	—
Quilota ⁴⁴	MWK	250	Pacific Steam Nav. Co.	300, 600	P G	N	0.40	—
Quilco ⁴⁴	GOC	140	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Quipue ⁴⁴	GLT	250	Pacific Steam Nav. Co.	300, 600	P G	N	0.40	—
Rabenfels (ex German vessel—see GERMANY)	—	—	—	—	—	—	—	—
Racchorse	—	—	—	—	—	—	—	—
Racburn ⁴⁴	MES	250	Navy	—	O ..	—	—	—
Ramos ⁸⁰	GLU	140	Lampport & Holt	300, 600	P G	X	0.40	—
Ranella ⁴⁴	MZP	150	Amazon Telegraph Co.	300, 600	P ..	—	—	—
Rangor MLD ⁸⁰	MLD	150	Anglo-Saxon Petroleum Co.	—	P ..	—	—	—
Raphael ⁴⁴	MET	140	Liverpool Salvage Association	300, 600	P ..	X	0.05 ⁸⁸	0.50 ⁸⁹
Rathmore ⁸⁰	GUT	250	Lampport & Holt	300, 600	P G	X	0.40	—
Rattlesnake	—	—	London & North Western Railway Co.	300, 600	P G	N	0.05	0.50
Reorder ⁸⁰	MEJ	140	Navy	—	O ..	—	—	—
Redpole	—	—	Eastern Extension Australasia & China Telegraph Co.	300, 600	P ..	—	0.40	—
Reinder ⁸⁰	MSD	120	Navy	—	O ..	—	—	—
Rembrandt MEU ⁴⁴	MEU	250	Great Western Railway Co.	300, 600	P G	N	0.05	0.50
			Lampport & Holt	300, 600	P G	X	0.05	0.40

Line	Ship	Company	Tonnage	Speed	Range	Armament	Notes
1	Renard	Reventazon	150	160	300, 600	0.40	X
2	Rheinfels (ex-German vessel—see GERMANY)	Riviera	150	160	300, 600	0.40	X
3	Ribble	Ricardo a Mestres	160	160	300, 600	0.40	X
4	Riflemen	Rinutaka	250	250	300, 600	0.40	X
5	Riviera	Riviera	50	50	300, 600	0.15	X
6	Robin	Robin	250	250	300, 600	0.40	X
7	Rosario	Rosario	250	250	300, 600	0.40	X
8	Rosetti	Rosetti	250	250	300, 600	0.40	X
9	Rotenfels (ex German vessel—see GERMANY)	Roth	180	180	300, 600	0.40	X
10	Roxburgh	Roxburgh	—	—	—	—	X
11	Royal Arthur	Royal Arthur	—	—	—	—	X
12	Royalist	Royalist	—	—	—	—	X
13	Royston Grange	Royston Grange	250	250	300, 600	0.40	X
14	Rubine	Rubine	250	250	300, 600	0.40	X
15	Ruspehu	Ruspehu	250	250	300, 600	0.40	X
16	Ruby	Ruby	—	—	—	—	X
17	Runic	Runic	250	250	300, 600	0.40	X
18	Sachem	Sachem	250	250	300, 600	0.40	X
19	St. Andrew	St. Andrew	120	120	300, 600	0.05	N
20	St. David	St. David	120	120	300, 600	0.05	N
21	St. George	St. George	120	120	300, 600	0.05	N
22	St. Patrick	St. Patrick	120	120	300, 600	0.05	N
23	St. Vincent	St. Vincent	120	120	300, 600	0.05	N
24	Saint Tuden	Saint Tuden	120	120	300, 600	0.05	N
25	Sakamis	Sakamis	120	120	300, 600	0.05	N
26	Saldanha	Saldanha	120	120	300, 600	0.05	N
27	Sandfly	Sandfly	120	120	300, 600	0.05	N
28	Sandpiper	Sandpiper	120	120	300, 600	0.05	N
29	San Dinstano	San Dinstano	120	120	300, 600	0.05	N
30	San Eduardo	San Eduardo	120	120	300, 600	0.05	N
31	San Fraterno	San Fraterno	120	120	300, 600	0.05	N
32	Sangola	Sangola	120	120	300, 600	0.05	N
33	San Gregorio	San Gregorio	120	120	300, 600	0.05	N
34	San Irenio	San Irenio	120	120	300, 600	0.05	N
35	San Lorenzo	San Lorenzo	120	120	300, 600	0.05	N
36	San Melito	San Melito	120	120	300, 600	0.05	N

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
BEAT BRITAIN—contd.								
San Nazario ⁴⁴	MUH	150	Eagle Oil Transport Co. ..	300, 800	P G	—	—	Francs.
San Ricardo ⁴⁴	MBR	250	Eagle Oil Transport Co. ..	300, 800	P G	X	—	0.40
San Silvestre ⁴⁴	MYS	—	Eagle Oil Transport Co. ..	300, 800	P G	—	—	0.40
Santhia ⁴⁴	GOF	160	British India Steam Nav. Co.	300, 800	P G	X	—	0.40
San Tiro ⁴⁴	MAO	250	Eagle Oil Transport Co. ..	300, 800	P G	X	—	0.40
San Valerio ⁴⁴	MHZ	250	Eagle Oil Transport Co. ..	300, 800	P G	X	—	0.40
San Zeferino ⁴⁴	MPS	250	Eagle Oil Transport Co. ..	300, 800	P G	X	—	0.40
Sapphire	—	—	Navy ..	—	O	—	—	—
Sapphire MHK ⁴⁴	MHK	200	Duke of Bedford ..	300, 800	P G	X	—	—
Sappho ..	—	—	Navy ..	—	O	—	—	—
Saracen	—	—	Navy ..	—	O	—	—	—
Sardinia GMB ⁴⁴	GMB	250	Peninsular & Oriental Steam Nav. Co.	300, 800	P G	X	—	0.40
Sardinian ⁴⁴	MDN	250	Allan Line ..	300, 800	P G	N	—	0.40
Samia MKY ⁴⁴	MKY	250	London & South Western Railway	300, 800	P G	N	—	0.15
Saturnia ⁴⁴	MBF	250	Anchor-Donaldson, Ltd. ..	300, 800	P G	N	—	0.40
Savage	—	—	Navy ..	—	O	—	—	—
Saxon ⁴⁴	MOI	250	Union Castle ..	300, 800	P G	N	—	0.40
Saxonia ⁴⁴	MSA	250	Cunard Line ..	300, 800	P G	N	—	0.40
Scandinavian ⁴⁴	MNC	250	Allan Line ..	300, 800	P G	N	—	0.40
Scindia ⁴⁴	MHJ	250	Anchor Line ..	300, 800	P G	X	—	0.40
Scorpion	—	—	Navy ..	—	O	—	—	—
Scotia ⁸⁰	GRR	170	London & North Western Railway Co.	300, 800	P G	N	—	0.50
Scotian ⁴⁴	MJN	250	Allan Line ..	300, 800	P G	N	—	0.40
Scourge	—	—	Navy ..	—	O	—	—	—
Scylla ..	—	—	Navy ..	—	O	—	—	—
Sealdia ⁴⁴	GOF	170	British India Steam Nav. Co.	300, 800	P G	X	—	0.40
Sentinel ..	—	—	Navy ..	—	O	—	—	—
Sentinel MFB ^{80 122}	MFB	140	Eastern Telegraph Co. ..	300, 450, 800	P	—	—	0.40
Shannon	—	—	Navy ..	—	O	—	—	—
Sharpshooter	—	—	Navy ..	—	O	—	—	—
Shieldrake	—	—	Navy ..	—	O	—	—	—
Sherard Osborn ^{80 122}	MFK	140	Eastern Telegraph Co. ..	300, 450, 800	P	—	—	0.40
Shirala ⁴⁴	GOG	170	British India Steam Nav. Co.	300, 800	P G	X	—	0.40
Shropshire ⁸⁰	GSF	330	Federal Steam Nav. Co. ..	300, 450, 800	P G	—	—	0.40
							9 a.m. to 12.30 p.m., 1 p.m. to 2 p.m., 4 p.m. to 6 p.m., 8 p.m. to 1 a.m.	

Ship	Company	Class	Port	Agent	Frequency	Remarks
Siellian 44	..	250	..	..	..	..
Silvertown 44	..	250	..	..	..	..
Singapore 44	..	140	..	..	..	..
Sir Harvey Adamson 44	..	150	..	..	..	..
Sirius 44
Skipjack 44
Skiprisher 44
Suip 44
Somali 44	..	250	..	..	..	..
Sorata 44	..	250	..	..	..	..
Soudan 44	..	250	..	..	..	..
Southampton 44	..	250	..	..	..	..
Southwestern Miller 44	..	170	..	..	..	..
Spanker 44
Spartiate 44
Sphinx 44
Spitfire 44
Staunch 44
Stephen 44	..	250	..	..	..	..
Stour 44
Strombus 44	..	150	..	..	..	..
Submarine B5	..	250	..	..	..	..
Suevic 44	..	250	..	..	..	..
Suffolk 44	..	300	..	..	..	..
Suffolk GRV 44
Superb 44
Surada 44	..	170	..	..	..	..
Surat 44	..	250	..	..	..	..
Sussex MVS 44	..	250	..	..	..	..
Sutherland Grange 44	..	250	..	..	..	..
Sutlej 44	..	115	..	..	..	..
Sutlej GWL 76	..	250	..	..	..	..
Suvero 44	..	150	..	..	..	..
Swanee 44
Swale 44
Swazi 44
Swift 44
Swiftsure 44
Sylvia 44
Syren 44
Syria GMP 44	..	250	..	..	..	..
Tabora (ex German vessel—see GERMANY)

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed	Hours of Service	Ship Charge.	
							Per Word.	Minimum Charge.
GREAT BRITAIN—contd.								
Tactician ⁴⁴	MWP	180	T. and J. Harrison	300, 600	P G	X	Francs. 0.40	Francs. —
Tagus ⁴¹	GUF	250	Royal Mail Steam Packet Co.	300, 600	P G	N	0.40	—
Tahiti ⁴¹	MYN	250	Union S.S. Co. of New Zealand	300, 600	P G	N	0.40	—
Tahiti ⁴¹	MYN	250	Union S.S. Co. of New Zealand	300, 600	P G	X	0.40	—
Tahiti ⁴¹	MYN	250	Union S.S. Co. of New Zealand	300, 600	P G	X	0.40	—
Takada ⁴⁴	MOR	250	British India Steam	300, 600	P G	X	0.40	—
Talbot	—	—	Navy	—	O	—	—	—
Talthyphius ⁸⁰	GSH	90	A. Holt & Co.	300, 450, 600	P G	X	0.40	4.00
Tara ⁴⁴	GMQ	250	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Taraba ⁴¹	GMR	250	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Tartar	—	—	Navy	—	O	—	—	—
Teal	—	—	Navy	—	O	—	—	—
Teesta ⁴¹	GMT	250	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Telouina ^{80, 122}	MCJ	140	Telegraph Construction & Maintenance Co.	300, 600	P	X	—	—
Temeraire	—	—	Navy	—	O	—	—	—
Tenasserim ⁷⁵	GQY	136	British & Burmese Steam Nav. Co.	300, 600	P G	10 a.m. to midday, 2 p.m. to 4 p.m., 8 p.m. to midnight	0.40	—
Tennyson ⁴⁴	GDG	250	Lampport & Holt	300, 600	P G	N	0.40	—
Terrible	—	—	Navy	—	O	—	—	—
Test	—	—	Navy	—	O	—	—	—
Tencer ⁸⁰	GSJ	90	A. Holt & Co.	300, 450, 600	P G	X	0.40	4.00
Teutonic ⁴⁴	MIC	250	White Star Line	300, 600	P G	N	0.40	—
Teviot	—	—	Navy	—	O	—	—	—
Thames	—	—	Navy	—	O	—	—	—
Themistocles MCM ⁴⁴	MGM	250	At. & deen Line (G. Thompson & Co.)	300, 600	P G	X	0.40	—
Thescus	—	—	Navy	—	O	—	—	—
Thetis	—	—	Navy	—	O	—	—	—
Thistle	—	—	Navy	—	O	—	—	—
Thongwa ⁴⁴	GMU	250	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Thorn	—	—	Navy	—	O	—	—	—
Thrasher	—	—	Navy	—	O	—	—	—
Thunderer	—	—	Navy	—	O	—	—	—
Tiger	—	—	Navy	—	O	—	—	—
Tigress	—	—	Navy	—	O	—	—	—
Titan ⁸⁰	GSO	90	A. Holt & Co.	300, 450, 600	P G	X	0.40	4.00
Tonawanda ⁴¹	GMV	150	Anglo-American Oil Co.	300, 600	P G	X	0.40	—
Tonze	—	—	Navy	—	O	—	—	—

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
GREAT BRITAIN—contd.								
Valiant GES ⁴⁴	GES	150	Lord Pirrie	300, 800	P G	X	Francs. 0.40	Francs. —
Varela ⁴⁴	MSR	250	British India Steam Nav. Co.	300, 800	P G	X	0.40	—
Varsova ⁴⁴	MUM	200	British India Steam Nav. Co.	300, 800	P G	X	0.40	—
Vasari ⁴⁴	GMZ	250	Lampart & Holt	300, 800	P G	N	0.40	—
Vauban ⁴⁴	MJW	250	Lampart & Holt	300, 800	P G	N	0.40	—
Velox ⁴⁴	—	—	Navy	—	O	—	—	—
Venerable	—	—	Navy	—	O	—	—	—
Vengeance	—	—	Navy	—	O	—	—	—
Venus ⁴⁴	—	—	Navy	—	O	—	—	—
Vernon ⁴⁴	—	—	Navy	—	O	—	—	—
Vestris ⁴⁴	—	—	Navy	—	O	—	—	—
Victor ⁴⁴	MJZ	250	Lampart & Holt	300, 800	P G	N	0.40	—
Victoria GUP ⁸⁰	GUP	50	South Eastern & Chatham Railway	300, 800	P G	N	0.15 ⁸⁰	1.50 ⁸⁰
Victoria MWD ⁴⁴	MWD	250	Pacific Steam Nav. Co.	300, 800	P G	N	0.40	—
Victoria and Albert ⁴⁴	—	—	Government	—	O	—	—	—
Victorian MVN ⁴⁴	MVN	250	Atlan Line	300, 800	P G	N	0.40	—
Victorious	—	—	Navy	—	O	—	—	—
Vienna ⁸⁰	GPL	130	Great Eastern Railway	300, 450, 800 ⁴⁸	O R ⁴⁷	N	0.10	1.00
Vigilant	—	—	Navy	—	O	—	—	—
Viking ⁴⁴	—	—	Navy	—	O	—	—	—
Viking MCD ^{81 188}	MCD	140	Amazon Telegraph Co.	300, 800	P	X	—	—
Vindictive	—	—	Navy	—	O	—	—	—
Violet ⁴⁴	—	—	Navy	—	O	—	—	—
Virginian MGN ⁴⁴	MGN	250	Atlan Line	300, 800	P G	N	0.40	—
Vita ⁴⁴	MZY	220	British India Steam Nav. Co.	300, 800	P G	X	0.40	—
Vitruvia ⁴⁴	GYS	150	Gow, Harrison & Co.	300, 800	P G	X	0.40	—
Vixen ⁴⁴	—	—	Navy	—	O	—	—	—
Volumina ⁴⁴	GRM	140	Gow, Harrison & Co.	—	P G	—	0.40	—
Vulcan ⁴⁴	—	—	Navy	—	O	—	—	—
Waimana ⁴⁴	GNE	250	Shaw Savill & Albion Co.	300, 800	P G	X	0.40	—
Waimate ⁷⁸	MOS	150	New Zealand Shipping Co.	300, 800	P G	X	0.40	—
Waipara ⁴⁴	GNK	250	British India Steam Nav. Co.	300, 800	P G	X	0.40	—
Waivera ⁴⁴	MRV	250	Shaw Savill & Albion Co.	300, 800	P G	X	0.40	—
Walmer Castle ⁴⁴	MOH	250	Union Castle	300, 800	P G	X	0.40	—
Watson Hall ⁴⁴	MIH	150	Hall Line	300, 800	P G	X	0.40	—
Warspite ⁴⁴	—	—	Navy	—	O	—	—	—
Wartum (ex German vessel—see GERMANY)	MYO	250	Ribby Bros. & Co.	300, 800	P G	X	—	0.40

[illegible]

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
GREECE—contd.								
Lonchi ..	SYC	—	Navy	—	O ..	—	—	—
Nafkratousa ..	SYR	—	Navy	—	O ..	—	—	—
Nea Gennea ..	SYG	—	Navy	—	O ..	—	—	—
Niki ..	SVN	—	Navy	—	O ..	—	—	—
Nirefs ⁴⁸ ..	SVN	150-200	Hellenic Company of Marine Enterprises	300, 600	P G	X	0.40	4.00
Panthir ..	SYV	—	Navy	—	O ..	—	—	—
Patris ⁴⁸ ..	SVP	140	National Steam Nav. Co. of Greece (Embiricos Bros.)	300, 450, 600	P G	N	0.40	4.00
Psara ..	SVQ	—	Navy	—	O ..	—	—	—
Sfendoni ..	SVF	—	Navy	—	O ..	—	—	—
Spetsai ..	SVS	—	Navy	—	O ..	—	—	—
Themistocles SVT ⁴⁸ ..	SVT	220	National Steam Nav. Co. of Greece (Embiricos Bros.)	300, 450, 600	P G	N	0.40	4.00
Thétis SYZ ..	SVZ	—	Navy	—	O ..	—	—	—
Thyella ..	SYT	—	Navy	—	O ..	—	—	—
Vasilefs Constantinos ⁴⁸ ..	SVV	200-250	National Steam Nav. Co. of Greece (Embiricos Bros.)	300, 600	P G	N	0.40	4.00
Velos ..	SYB	—	Navy	300, 600	O ..	—	—	—
HOLLAND								
Ameland ⁴⁸ ..	PIX	50-80	Stoomvaart Maatschappij Triton	300, 600	P G	X	0.40	4.00
American PDT ¹¹ ..	PDT	100-150	American Petroleum Co. ..	300, 600	P G	X	0.40	4.00
Anton van Driel ¹¹ ..	PEP	100-150	Van Driel's N./V.W. Stoomb. en Transp.	300, 600	P G	X	0.40	4.00
Arakan ¹¹ ..	PHD	100-150	Rotterdamsche Lloyd ..	300, 600	P G	X	0.40	4.00
Artemis PDZ ¹¹ ..	PDZ	150-200	Petroleum Maats. "La Coroua"	300, 600	P G	X	0.40	4.00
Arundo ¹⁴⁸ ..	PXA	100-150	Maatschappij Zeevaart (Hudig & Veder)	300, 600	P G	X	0.40	4.00
Atlas PIB ¹¹ ..	PIB	75-100	Amsterdam Tug and Salvage Co.	300, 450, 600	P G	X	0.40	4.00
Bali ¹¹ ..	PIK	100-150	"Nederland" Stoomvaart Maatschappij	300, 600	P G	X	0.40	4.00
Banka ¹¹ ..	PHI	100-150	"Nederland" Stoomvaart Maatschappij	300, 600	P G	X	0.40	4.00
Batavier III. ¹¹ ..	PDH	200	Wm. H. Müller & Co. ..	300, 450, 600	P R ⁴⁸	N	0.05 ⁴⁸	0.50 ⁴⁸
Batavier IV. ¹¹ ..	PDI	200	Wm. H. Müller & Co. ..	300, 450, 600	P R ⁴⁸	N	0.05 ⁴⁸	0.50 ⁴⁸
Medion ¹¹ ..	DOV	—	..	—	..	N	0.05 ⁴⁸	0.50 ⁴⁸

[illegible]

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
HOLLAND—contd.								
Hertog Hendrik	PAD	200	Navy	300, 600	O*	—	Francs.	—
Holland PAH	PAH	200	Navy	300, 600	O*	—	—	—
Hollandia "	PEH	200-250	Koninklijke Hollandsche Lloyd..	300, 600	P G	N	0.40	4.00
Hydra PAQ	PAQ	60	Navy	300, 600	O*	—	—	—
Insulinde "	PFS	150-200	Rotterdamsche Lloyd	300, 600	P G	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Tris PHQ ^M	PHQ	150-200	Petroleum Maats. "La Corona "	300, 600	P G	X	0.40	4.00
Jacob van Heemskerck	PAL	100	Navy	300, 600	O*	—	—	—
Jakobs ..	PBU	150	Navy	300, 600	O*	—	—	—
Jan Pieterszoon Coen "	PFL	150-200	"Nederland" Stoomvaart Maats- chappij	300, 600	P G	6 a.m. to 8.10 a.m., 9 a.m. to 12.10 p.m., 2 p.m. to 6.10 p.m., 8 p.m. to 10.10 p.m.	0.40	4.00
J. B. Aug. Kessler "	PDV	150-200	Petroleum Maats. "La Corona "	300, 600	P G	X	0.40	4.00
Johanna ¹³⁹ ..	PYA	100-150	Maats. Stooms. "Johanna" (Jos. de Poorter)	300, 600	P G	X	0.40	4.00
Juno PDU ^{11 31}	PDU	150-200	Ned.-Ind. Tank-stoombootmaats- chappij	300, 600	P G	X	0.40	4.00
Kanbangan "	PGS	100-150	"Nederland" Stoomvaart Maats- chappij	300, 600	P G	X	0.40	4.00
Kangean "	PGP	100-150	"Nederland" Stoomvaart Maats- chappij	300, 600	P G	X	0.40	4.00
Karimata ¹¹ ..	PGQ	100-150	"Nederland" Stoomvaart Maats- chappij	300, 600	P G	X	0.40	4.00
Karimoe ¹¹ ..	PGW	100-150	"Nederland" Stoomvaart Maats- chappij	300, 600	P G	X	0.40	4.00
Kawi ¹¹ ..	PFD	200	Rotterdamsche Lloyd	300, 600	P G	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Koningen der Nederlanden "	PFO	200	"Nederland" Stoomvaart Maats- chappij	300, 600	P G	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00

Lombok ¹¹	..	..	PGN	100-150	chappij Nederlandsche Stoomvaart Maats-	300, 600	P G	..	X	0.40	4.00
Lynx PBX	..	..	PBX	150	Navy	300, 600	O ⁶¹	..	—	0.40	4.00
Maarten Harpertz Tromp	..	..	PAB	400	Navy	300, 600	O ⁶¹	..	—	—	—
Madioen ¹¹	..	..	PGI	100-150	Rottersdamsche Lloyd	300, 600	P G	..	—	0.40	4.00
Maria ¹¹	..	..	PDK	50-80	Holland Gulf Stoomvaart Maats-	300, 600	P G	..	—	0.40	4.00
Medan ¹¹	..	..	PGA	100-150	chappij (J. de Poorter)	300, 600	P G	..	X	0.40	4.00
Medusa PAR	..	..	PAR	60	Rottersdamsche Lloyd	300, 600	O ⁶¹	..	—	—	—
Menado ¹¹	..	..	PGB	100-150	Rottersdamsche Lloyd	300, 600	P G	..	—	0.40	4.00
Merak ¹¹	..	..	PGE	100-150	Rottersdamsche Lloyd	300, 600	P G	..	—	0.40	4.00
Mirach ¹¹	..	..	PXI	200	Van Nieuvelt Goudriaan Stoomv.	300, 600	P G	..	—	0.40	4.00
New York PHN ¹¹	..	..	PHN	100-150	Maats.	300, 600	P G	..	X	0.40	4.00
Nias ¹¹	..	..	PCR	100-150	American Petroleum Co. ¹¹	300, 600	P G	..	X	0.40	4.00
Nickerie ¹¹	..	..	PER	150-200	chappij "Nederlandsche Stoomvaart Maats-	300, 600	P G	..	X	0.40	4.00
Nieuw Amsterdam ¹¹	..	..	PEB	200-250	Koninklijke West-Indische Mail-	300, 600	P G	..	5 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Noordam ¹¹	..	..	PEC	200-250	dienst	300, 600	P G	..	—	0.40	4.00
Noordbrabant	..	..	PAJ	200	Holland-Amerika Line	300, 600	P G	..	N	0.40	4.00
Noordwijk ¹¹	..	..	PAI	200	Holland-Amerika Line	300, 600	O ⁶¹	..	N	—	—
Ocean PDS ¹¹	..	..	PHG	100	Navy	300, 600	P G	..	—	0.40	4.00
Onderzeeboot ¹¹	..	..	PDS	100-150	Erhardt & Dekkers	300, 600	P G	..	X	0.40	4.00
Oosterdijk ¹¹	..	..	PBO ⁶¹	20	American Petroleum Co.	300	O ⁶¹	..	X	0.40	4.00
	..	..	PGX	200	Navy	300	P G	..	—	—	—
	..	..			Holland-Amerika Line	300, 450, 600	P G	..	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Opbr PFB ¹¹	..	..	PFB	200	Rottersdamsche Lloyd	300, 600	P G	..	—	0.40	4.00
Oranje ¹¹	..	..	FFP	200	"Nederlandsche Stoomvaart Maats-	300, 600	P G	..	—	0.40	4.00
	..	..			chappij	300, 600	P G	..	—	0.40	4.00
Oranje Nassau PDE ^{57 66}	..	..	PDE	150	Zeeland Co.	300, 500, ¹⁸ 600	P R ⁶⁰	..	N	— ⁶²	—
Oranje Nassau PEM ¹¹	..	..	PEM	150-200	Koninklijke West Indische Mail-	300, 600	P G	..	6 a.m. to 8 a.m., 9 a.m. to midday, 1 p.m. to 5 p.m.	0.40	4.00
	..	..			dienst	300, 600	P G	..	—	—	—
Panther ..	..	..	PBS	150	Navy	300, 600	O ⁶¹	..	—	—	—
Piet Hein ..	..	..	PAO	100	Navy	300, 600	O ⁶¹	..	—	—	—
Prins der Nederlanden PEN ¹¹	..	..	PEN	150-200	Koninklijke West Indische Mail-	300, 600	P G	..	5 a.m. to 8 a.m., 9 a.m. to midday, 1 p.m. to 5 p.m.	0.40	4.00
	..	..			dienst	300, 600	P G	..	—	—	—

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
HOLLAND—contd.								
Prins der Nederlanden ¹¹	PFQ	200	"Nederland" Stoomvaart Maatschappij	300, 600	P G	6 a.m. to 9 a.m., 10 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	Francs. 0.40	4.00
Prinses Juliana ¹¹	PFN	200	"Nederland" Stoomvaart Maatschappij	300, 600	P G	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Prins Frederik Hendrik ¹¹	PEK	150-200	Koninklijke West Indische Maildienst	300, 600	P G	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Prins Hendrik ¹¹ ¹¹	PDC	150	Zeeland Co.	300, 500, ¹¹ 600	P R ¹¹	9 a.m. to midday, 1 p.m. to 5 p.m.	— ¹¹	— ¹¹
Prins Willem I. ¹¹	PEO	200	Koninklijke West Indische Maildienst	300, 600	P G	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Radja ¹¹	PHA	100-150	"Nederland" Stoomvaart Maatschappij	300, 450, 600	P G	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Randwijk ¹¹	PIU	50-80	Erhardt & Dekkers	300, 600	P G	X	0.40	4.00
Rembrandt PFK ¹¹	PFK	200	"Nederland" Stoomvaart Maatschappij	300, 600	P G	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Rijndam ¹¹	PED	200-250	Holland-Amerika Line	300, 600	P G	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Rijswijk ¹¹	PIT	50-80	Erhardt & Dekkers	300, 600	P G	X	0.40	4.00
Rindjani ¹¹	PFH	200	Rotterdamsche Lloyd	300, 600	P G	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Riouw ¹¹	PHB	100-150	"Nederland" Stoomvaart Maatschappij	300, 600	P G	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Roepat ¹¹	PHL	100-150	"Nederland" Stoomvaart Maatschappij	300, 450, 600	P G	X	0.40	4.00
Rondo ¹¹	PHM	100-150	"Nederland" Stoomvaart Maatschappij	300, 600	P G	X	0.40	4.00
Roode Zee ¹¹ ¹¹	PIA	100	L. Smit & Co.'s Sleepdienst	300, 600	P G	X	0.40	4.00
Rotterdam PEA ¹¹	PEA	200-250	Holland-Amerika Line	300, 600	P G	X	0.40	4.00
Rotterdam PEA ¹¹	PEA	200-250	American Petroleum Co.	300, 600	P G	X	0.40	4.00

Schedijk ¹¹	100-150	PIQ	Rotterdam	..	..	300, 800	P G	..	..	6 a.m. to 8 a.m., 9 a.m. to 10 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Selene ¹¹ ^a	150-200	PIW	Holland-Amerika Line	..	..	300, 800	P G	..	..	9 a.m. to 10 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Simson ¹¹ ^{as}	50-100	PIE	Petroleum Maats. "La Corona"	..	..	300, 800	P G	..	..	6 a.m. to 8 a.m., 9 a.m. to 10 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Sindoro ¹¹	200	PFE	Amsterdam Tug & Salvage Co.	..	..	300, 800	P G	..	..	6 a.m. to 8 a.m., 9 a.m. to 10 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Sirrah ¹¹ ^{as}	200	PXJ	Rotterdamse Lloyd	..	..	300, 800	P G	..	..	6 a.m. to 8 a.m., 9 a.m. to 10 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Sitoebondo ¹¹	100-150	PHT	Van Nieuvelt Goudriaan Stoomv. Maats.	..	..	300, 800	P G	..	..	6 a.m. to 8 a.m., 9 a.m. to 10 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Soerakarta ¹¹	100-150	PGI	Rotterdamse Lloyd	..	..	300, 800	P G	..	..	6 a.m. to 8 a.m., 9 a.m. to 10 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Sumatra PGM ¹¹	100-150	PGM	Rotterdamse Lloyd	..	..	300, 800	P G	..	..	6 a.m. to 8 a.m., 9 a.m. to 10 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Tabanan ¹¹	200	PFF	"Nederland" Stoomvaart Maatschappij	..	..	300, 800	P G	..	..	6 a.m. to 8 a.m., 9 a.m. to 10 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Tambora ¹¹	200	PFC	Rotterdamse Lloyd	..	..	300, 800	P G	..	..	6 a.m. to 8 a.m., 9 a.m. to 10 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Termate ¹¹	100-150	PGF	Rotterdamse Lloyd	..	..	300, 800	P G	..	..	6 a.m. to 8 a.m., 9 a.m. to 10 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Themisto ¹¹	50-80	PXB	Maatschappij Zeevaart (Hudig & Veder)	..	..	300, 600	P G	..	..	6 a.m. to 8 a.m., 9 a.m. to 10 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Torpedoboot ⁴¹	40	PAG ⁴¹	Navy	..	..	300	O ⁴¹	..	..	6 a.m. to 8 a.m., 9 a.m. to 10 p.m., 8 p.m. to 10 p.m.	—	—
Tosari ¹¹	100-150	PIO	Rotterdamse Lloyd	..	..	300, 800	P G	..	..	6 a.m. to 8 a.m., 9 a.m. to 10 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Turbina PHR ⁴¹	100-150	PHR	Ruys & Zoonen	..	..	300, 800	P G	..	..	6 a.m. to 8 a.m., 9 a.m. to 10 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Veendyk ¹¹	150-200	PIR	Holland-Amerika Line	..	..	300, 800	P G	..	..	6 a.m. to 8 a.m., 9 a.m. to 10 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Vondel ¹¹	200	PFM	"Nederland" Stoomvaart Maatschappij	..	..	300, 800	P G	..	..	6 a.m. to 8 a.m., 9 a.m. to 10 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Vos ¹¹	150	PBV	Navy	..	..	300, 800	O ⁴¹	..	..	6 a.m. to 8 a.m., 9 a.m. to 10 p.m., 8 p.m. to 10 p.m.	—	—
Westerdijk ¹¹	200	PGZ	Holland-Amerika Line	..	..	300, 450, 600	P G	..	..	6 a.m. to 8 a.m., 9 a.m. to 10 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Wilis ¹¹	200	PFG	Rotterdamse Lloyd	..	..	300, 800	P G	..	..	6 a.m. to 8 a.m., 9 a.m. to 10 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Willem van Driel Sr. ¹¹	100-150	PHW	Van Driel's N/V.W., Stoomb. en Transp.	..	..	300, 600	P G	..	..	6 a.m. to 8 a.m., 9 a.m. to 10 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Winterswijk ⁴¹	50-80	PIS	Erhardt & Dekkers	..	..	300, 800	P G	..	..	6 a.m. to 8 a.m., 9 a.m. to 10 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Witte Zee ¹¹ ¹¹⁴	75-125	PIC	L. Smit & Co.'s Sleepdienst	..	..	300, 800	P G	..	..	6 a.m. to 8 a.m., 9 a.m. to 10 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Wolf PBW ¹¹	150	PBW	Navy	..	..	300, 800	O ⁴¹	..	..	6 a.m. to 8 a.m., 9 a.m. to 10 p.m., 8 p.m. to 10 p.m.	—	—
Yeldijk ⁴¹	150-200	PJP	Holland-Amerika Line	..	..	300, 800	P G	..	..	6 a.m. to 8 a.m., 9 a.m. to 10 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Zeehond	100	PAZ	Navy	..	..	300, 800	O ⁴¹	..	..	6 a.m. to 8 a.m., 9 a.m. to 10 p.m., 8 p.m. to 10 p.m.	—	—
Zeeland PDA ⁴¹ ¹¹⁴	150	PDA	Zeeland Co.	..	..	300, 500, ¹¹⁴ 600	P R ⁴¹	..	..	6 a.m. to 8 a.m., 9 a.m. to 10 p.m., 8 p.m. to 10 p.m.	—	—
Zeeland PAF ¹¹	200	PAF	Navy	..	..	300, 800	O ⁴¹	..	..	6 a.m. to 8 a.m., 9 a.m. to 10 p.m., 8 p.m. to 10 p.m.	—	—
Zeelandia ¹¹	200-250	PEI	Koninklijke Hollandische Lloyd	..	..	300, 800	P G	..	..	6 a.m. to 8 a.m., 9 a.m. to 10 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Zwarte Zee ¹¹ ¹¹⁴	75-125	PID	L. Smit & Co.'s Sleepdienst	..	..	300, 800	P G	..	..	6 a.m. to 8 a.m., 9 a.m. to 10 p.m., 8 p.m. to 10 p.m.	0.40	4.00

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
HONDURAS (REPUBLIC OF)								
Tegucigalpa ¹¹	VB	—	Vaccaro Bros. & Co.	—	P G	X	Francs. 0.40	Francs. —
Yoro ¹¹	VY	—	Vaccaro Bros. & Co.	—	P G	X	0.40	—
HONG KONG								
Aspinet ¹¹	—	125	Standard Transportation Co., Ltd.	300, 600	P ..	X	—	—
Hunslet (ex Tannenfels—see GERMANY)	—	—	—	—	—	—	—	—
Massonimo ¹¹	—	125	Standard Transportation Co., Ltd.	300, 600	P ..	X	—	—
Massasoit ¹¹	—	125	Standard Transportation Co., Ltd.	300, 600	P G	X	—	—
Mexico City ¹¹	VRG	—	Mexico S.S. Co., Ltd.	300, 600	P G	—	0.40	—
Nile ¹¹	VRE	300	China Pacific S.S. Co.	300, 600	P ..	N	—	—
Onaka ¹¹	—	125	Standard Transportation Co., Ltd.	300, 600	P ..	X	—	—
Samoset ¹¹	—	125	Standard Transportation Co., Ltd.	300, 600	P ..	X	—	—
Satanita ¹¹	—	125	Standard Transportation Co., Ltd.	300, 600	P ..	X	—	—
Sequoia ¹¹	—	130	Standard Transportation Co., Ltd.	300, 600	P ..	X	—	—
Shabonice ¹¹	—	140	Standard Transportation Co., Ltd.	300, 600	P ..	X	—	—
Tahchee ¹¹	—	140	Standard Transportation Co., Ltd.	300, 600	P ..	X	—	—
Tamaha ¹¹	—	140	Standard Transportation Co., Ltd.	300, 600	P ..	X	—	—
Tascalusa ¹¹	—	140	Standard Transportation Co., Ltd.	300, 600	P ..	X	—	—
Tatarax ¹¹	—	140	Standard Transportation Co., Ltd.	300, 600	P ..	X	—	—
Uncas ¹¹	—	140	Standard Transportation Co., Ltd.	300, 600	P ..	X	—	—
Wabasa ¹¹	—	140	Standard Transportation Co., Ltd.	300, 600	P ..	X	—	—
Wapello ¹¹	—	125	Standard Transportation Co., Ltd.	300, 600	P ..	X	—	—
Winamac ¹¹	—	140	Standard Transportation Co., Ltd.	300, 600	P ..	X	—	—
HUNGARY¹¹								
Ferencz Ferdinánd	HDA	Day, 200; night, 300	Royal Hungarian Sea Nav. Co. "Adria"	300, 600	P G	8 a.m. to midday, 4 p.m. to midnight	0.40	4.00
Ferencz József Király ¹¹	HBA	Day, 200; night, 300	Royal Hungarian Sea Nav. Co. "Adria"	300, 600	P G	8 a.m. to midday, 4 p.m. to midnight	0.40	4.00
ITALY								
Adriatico ¹¹	IFG	100	State Railway Administration	300, 600	P ..	X	0.40	—

[illegible]

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
ITALY—contd.								
Corazziere	IIK	—	Navy	—	—	—	Francs.	Francs.
Cordova IYJ **	IYJ	190	Lloyd Italiano	300, 600	P G	X	0.40	—
Crena (ex Segovia—see GERMANY)	—	—	—	—	—	—	—	—
Dandolo	IHH	—	Navy	—	—	—	—	—
Dante Alighieri IHC	IHC	—	Navy	—	—	—	—	—
Dante Alighieri IUH **	IUH	270	Transatlantica Italiana Soc. di Nav.	300, 600	P G	N	0.40	—
Dardo	IIL	—	Navy	—	—	—	—	—
Duca d'Aosta **	IZT	270	Navigazione Générale Italiana	300, 600	P G	N	0.40	—
Duca degli Abruzzi **	IZZ	270	Navigazione Générale Italiana	300, 600	P G	N	0.40	—
Duca di Genova **	IZG	270	La Veloce Navigazione Italiana a Vap.	300, 600	P G	N	0.40	—
Duilio	IHB	—	Navy	—	—	—	—	—
Elba	IKI	—	Navy	—	—	—	—	—
Emanuele Filiberto	IHW	—	Navy	—	—	—	—	—
Entella **	INW	140	Soc. di Nav., Sicilia	300, 600	P	X	0.40	—
Eridano	IGO	—	Navy	—	—	—	—	—
Eritrea	IGX	—	Navy	—	—	—	—	—
Espero	IM	—	Navy	—	—	—	—	—
Etna IKG	IKG	—	Navy	—	—	—	—	—
Etna IKP	IKP	—	Navy	—	—	—	—	—
Etruria INQ **	INQ	140	Soc. di Nav., Sicilia	300, 600	P	X	0.40	—
Eugenia (ex Austrian vessel—see AUSTRIA)	—	—	—	—	—	—	—	—
Euro	IIN	—	Navy	—	—	—	—	—
Europa IEE **	IEE	270	La Veloce Navigazione Italiana a Vap.	300, 600	P G	N	0.40	—
Feltre (ex Rhenania—see GERMANY)	—	—	—	—	—	—	—	—
Ferdinando Palasciano (ex König Albert—see GERMANY)	—	—	—	—	—	—	—	—
Ferrara (ex Sturmfels—see GERMANY)	—	—	—	—	—	—	—	—
Flavio Gioia	IGE	—	Navy	—	—	—	—	—
Francesco Ferruccio	IHZ	—	Navy	—	—	—	—	—
Fratelli Bandiera (ex Christian X.—see GERMANY)	—	—	—	—	—	—	—	—
Fuciliere	IIO	—	Navy	—	—	—	—	—
Fulmine	IIP	—	Navy	—	—	—	—	—
Gallarate (ex Italia—see GERMANY)	IIP	—	Transatlantica Italiana Soc. di Nav.	300, 600	P G	N	—	—

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Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
ITALY—contd.								
Po ⁶⁶	INY	140	Soc. di Nav., Sicilia	300, 600	P ..	X	Francs. 0.40	Francs. —
Pontida (ex Kattenturm—see GERMANY)	—	—	..	—	—	—	—	—
Pontiere	IIC	—	Navy	—	—	—	—	—
Porto di Alessandretta ⁶⁶	INT	190	Societa Marittima Italiana	300, 600	P ..	X	0.40	—
Porto di Savona ⁶⁶	INV	190	Societa Marittima Italiana	300, 600	P G	X	0.40	—
Principe di Udine ⁶⁶	IYU	270	Lloyd Sabaudo	300, 600	P G	N	0.40	—
Principessa Mafalda ⁶⁶	IYM	270	Lloyd Italiano	300, 600	P G	N	0.40	—
Prinz-Regent Luitpold (ex German vessel—see GERMANY)	—	—	—	—	—	—	—	—
Procida ⁶⁶	IZD	190	Navigazione Generale Italiana	300, 600	P ..	X	0.40	—
Prometeo ⁶⁶	IEK	100	State Railway Administration	600	O ..	X	—	—
Puglia	IKK	—	Navy	—	—	—	—	—
Quarto	IKD	—	Navy	—	—	—	—	—
Re d'Italia ⁶⁶	IYR	190	Lloyd Sabaudo	300, 600	P G	N	0.40	—
Regina d'Italia ⁶⁶	INI	190	Lloyd Sabaudo	300, 600	P G	N	0.40	—
Regina Elena IHQ ⁶⁶	IHQ	—	Navy	—	—	—	—	—
Regina Elena IZE ⁶⁶	IZE	270	Navigazione Generale Italiana	300, 600	P G	N	0.40	—
Re Umberto IHK ⁶⁶	IHK	—	Navy	—	—	—	—	—
Re Vittorio ⁶⁶	IZV	270	Navigazione Generale Italiana	300, 600	P G	N	0.40	—
Roma IHP ⁶⁶	IHP	—	Navy	—	—	—	—	—
Roma INR ⁶⁶	INR	110	Societa Marittima Italiana	300, 600	P G	X	0.40	—
San Giorgio IEA ⁶⁶	IEA	190	Societa "Transoceanica"	300, 600	P G	N	0.40	—
San Giorgio IHU ⁶⁶	IHU	—	Navy	—	—	—	—	—
San Giovanni ⁶⁶	IEC	190	Societa "Transoceanica"	300, 600	P G	N	0.40	—
San Guglielmo ⁶⁶	IEB	190	Societa "Transoceanica"	300, 600	P G	N	0.40	—
San Marco	IHT	—	Navy	—	—	—	—	—
Sardagna IHM ⁶⁶	IHM	—	Navy	—	—	—	—	—
Sardagna INS ⁶⁶	INS	110	Soc. Italiana di Servizi Marittimi	300, 600	P G	X	0.40	—
Savoia ⁶⁶	IEH	190	La Veloce Navigazione Italiana a Vap.	300, 600	P G	N	0.40	—
Sebastiano Caboto	IGZ	—	Navy	—	—	—	—	—
Sicilia IHL ⁶⁶	IHL	—	Navy	—	—	—	—	—
Sicilia INL ⁶⁶	INL	110	Soc. Italiana di Servizi Marittimi	300, 600	P G	X	0.40	—
Solunto ⁶⁶	IEU	140	Soc. di Nav., Sicilia	300, 600	P ..	X	0.40	—
Splendor ⁶⁶	ILS	190	"La Columbia" Soc. Marit. per Trasporto di petrolio e Derivati	300, 600	P ..	X	0.40	—
Storope	IGK	—	Navy	—	—	—	—	—

Taormina ⁶⁶	..	..	..	270	Lloyd Italiano	..	300, 600	P G	..	N	0.40
Tobruk	..	..	..	—	Navy	..	—	—	..	—	—
Tomaso di Savoia ⁶⁶	..	..	..	190	Lloyd Sabauda	..	300, 600	P G	..	N	0.40
Toscana ⁶⁶	..	..	..	190	Societa "Transoceanica"	..	300, 600	P G	..	N	0.40
Trinacria ⁶⁶	..	..	..	—	Government	..	—	—	..	—	—
Tripoli	..	..	..	—	Navy	..	—	—	..	—	—
Umbria ⁶⁶	..	..	..	190	Soc. Italiana di Servizi Marittimi	..	300, 600	P G	..	X	0.40
Varese	..	..	..	—	Navy	..	—	—	..	—	—
Verona ⁶⁶	..	..	..	190	Navigatione Generale Italiana	..	300, 600	P G	..	N	0.40
Vesuvio	..	..	..	270	Navigatione Generale Italiana	..	300, 600	P ..	..	X	0.40
Vittorio Emanuele	..	..	..	—	Navy	..	—	—	..	—	—
Vulcano IGL	..	..	..	—	Navy	..	—	—	..	—	—
Vulcano IZO ⁶⁶	..	..	..	190	Navigatione Generale Italiana	..	300, 600	P ..	..	X	0.40
Zeffireo	..	..	..	—	Navy	..	—	—	..	—	—
JAPAN											
Azuma	..	..	..	—	Navy	..	—	—	..	—	—
Akashi	..	..	..	—	Navy	..	—	—	..	—	—
Aki	..	..	..	—	Navy	..	—	—	..	—	—
Aki Maru ⁶⁶	..	..	..	Day, 500 ; night, 1500	Nippon Yusen Mail S.S. Co.)	..	300, 600	P G	..	N	0.40
Akitsuishima	..	..	..	Day, 400	Navy	..	—	—	..	—	—
Amagisan Maru ⁶⁶	..	..	..	—	Ryoto Kisen Kaisha (Mitsui Bussan Kaisha)	..	300, 600, 1,800	P G	..	8 a.m. to 11 a.m., 2 p.m. to 5 p.m., 8 p.m. to midnight	0.40
America Maru ⁶⁶	..	..	..	Day, 400 ; night, 1000	Osaka Shosen Kaisha (Osaka Mer- cantile Co.)	..	300, 600	P G	..	N	0.40
Anyo Maru ⁶⁶	..	..	..	Day, 450 ; night, 900	Toyo Kisen Kaisha (Oriental S.S. Co.)	..	300, 600	P G	..	N	0.40
Asahi	..	..	..	—	Navy	..	—	—	..	—	—
Asama	..	..	..	—	Navy	..	—	—	..	—	—
Aso	..	..	..	—	Navy	..	—	—	..	—	—
Atagosan Maru ⁶⁶	..	..	..	Day, 400	Ryoto Kisen Kaisha (Mitsui Bus- san Kaisha)	..	300, 600, 1,800	P G	..	8 a.m. to 11 a.m., 2 p.m. to 5 p.m., 8 p.m. to mid- night	0.40
Atsuta Maru ⁶⁶	..	..	..	Day, 450 ; night, 1200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	..	300, 600, 1,800	P G	..	N	0.40
Awa Maru ⁶⁶	..	..	..	Day, 300 ; night, 1000	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	..	300, 600	P G	..	N	0.40
Ayaha Maru ⁶⁶	..	..	..	Day, 400	Tatsuuma Kisen Kaisha	..	300, 600, 1,800	P G	..	8 a.m. to 11 a.m., 2 p.m. to 5 p.m., 8 p.m. to midnight	0.40
Azuma Maru ⁶⁶	..	..	..	Day, 400	Tokyo Salvage Co.	..	300, 600	P G	..	8 a.m. to 11 a.m., 2 p.m. to 5 p.m., 8 p.m. to midnight	0.40
Azumasan Maru ⁶⁶	..	..	..	Day, 400	Ryoto Kisen Kaisha (Mitsui Bussan Kaisha)	..	300, 600, 1,800	P G	..	8 a.m. to 11 a.m., 2 p.m. to 5 p.m., 8 p.m. to midnight	0.40
Bingo Maru ⁶⁶	..	..	..	Day, 300 ; night, 1000	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	..	300, 600	P G	..	N	0.40

Ship Stations—Continued

Name	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
JAPAN—contd.								
Borneo Maru **	JPB	Day, 400	Nanyo Yusen Kaisha ..	300, 800, 1,800	PG	N	Franks. 0.40	—
Burma Maru **	JYY	Day, 400	Osaka Shosen Kaisha (Osaka Mercantile Co.)	300, 800, 1,800	PG	8 a.m. to 11 a.m., 2 p.m. to 5 p.m., 8 p.m. to midnight	0.40	—
Calcutta Maru **	JBC	Day, 400	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 800	PG	8 a.m. to 11 a.m., 2 p.m. to 5 p.m., 8 p.m. to midnight	0.40	—
Canada Maru **	JCD	Day, 350; night, 1200	Osaka Shosen Kaisha (Osaka Mercantile Co.)	300, 800	PG	N	0.40	—
Chicago Maru **	JCC	Day, 350; night, 1200	Osaka Shosen Kaisha (Osaka Mercantile Co.)	300, 800	PG	N	0.40	—
Chihaya	JWB	—	Navy ..	—	O ..	—	—	—
Chikuma	JLG	—	Navy ..	—	O ..	—	—	—
Chitose ..	JLB	—	Navy ..	—	O ..	—	—	—
Chiyoda	JUP	—	Navy ..	—	O ..	—	—	—
Chosen Maru **	JPV	Day, 200	Osaka Shosen Kaisha (Osaka Mercantile Co.)	300, 800, 1,800	PG	N	0.40	—
Colombo Maru **	JYB	Day, 200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 800, 1,800	PG	8 a.m. to 11 a.m., 2 p.m. to 5 p.m., 8 p.m. to midnight	0.40	—
Fuji ..	JUC	—	Navy ..	—	O ..	—	—	—
Fukui Maru **	JYT	Day, 200	Uchida Kisen Kabushiki Kaisha	300, 800	PG	8 a.m. to 11 a.m., 2 p.m. to 5 p.m., 8 p.m. to midnight	0.40	—
Fushimi	JWJ	—	Navy ..	—	O ..	—	—	—
Fushimi Maru **	JFM	Day, 450; night, 1200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 800, 1,800	PG	N	0.40	—
Fuso	JGN	—	Navy ..	—	O ..	—	—	—
Genmei Maru **	JBN	Day, 400	Uyemichi Company	300, 800, 1,800	PG	8 a.m. to 11 a.m., 2 p.m. to 5 p.m., 8 p.m. to midnight	0.40	—
Hakata Maru **	JPK	Day, 200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 800, 1,800	PG	N	0.40	—
Hakushika Maru **	JBX	Day, 400	Tatsuma Kisen Kaisha ..	300, 800, 1,800	PG	8 a.m. to 11 a.m., 2 p.m. to 5 p.m., 8 p.m. to midnight	0.40	—
Harbin Maru **	JHB	Day, 450; night, 1200	Osaka Shosen Kaisha (Osaka Mercantile Co.)	300, 800	PG	N	0.40	—
Haruna	JGX	—	Navy ..	—	O ..	—	—	—
Hokkaido	HTO	—	Navy ..	—	O ..	—	—	—

Ship	Company	Agent	Days	Time	Passes	Fares	Notes	Remarks
Hayatori Maru	..	JHY	..	..	..	300, 600	..	0.40
Hiei	..	JGV	..	..	..	..	..	..
Hirano Maru	..	JHR	..	..	..	300, 600, 1,800	..	0.40
Hirato	..	JLJ	..	..	..	..	..	..
Hizen	..	JGD	..	..	..	..	..	..
Hokkai Maru	..	JYP	..	..	..	300, 600, 1,800	..	0.40
Hongkong Maru	..	JHN	..	..	..	300, 600	..	0.40
Hozan Maru	..	JYZ	..	..	..	300, 600, 1,800	..	0.40
Ibuki	..	JGT	..	..	..	..	..	..
Idzumo	..	JRG	..	..	..	..	..	..
Iki Maru	..	JIL	..	..	..	300, 600, 1,800	..	0.40
Ikona	..	JGQ	..	..	..	..	..	..
Inaba Maru	..	JIB	..	..	..	300, 600, 1,800	..	0.40
Itsukushima	..	JUN	..	..	..	..	..	..
Iwami	..	JUD	..	..	..	..	..	..
Iwate	..	JRF	..	..	..	..	..	..
Iyo Maru	..	JPO	..	..	..	300, 600, 1,800	..	0.40
Kaga Maru	..	JPG	..	..	..	300, 600, 1,800	..	0.40
Kagi Maru	..	JKG	..	..	..	300, 600	..	0.40
Kaifuku Maru	..	JBF	..	..	..	300, 600, 1,800	..	0.40
Kamakura Maru	..	JPR	..	..	..	300, 600, 1,800	..	0.40
Kamo Maru	..	JKA	..	..	..	300, 600	..	0.40
Kanagawa Maru	..	JNA	..	..	..	300, 600, 1,800	..	0.40
Karasaki	..	JUV	..	..	..	..	..	..
Kasato Maru	..	JKT	..	..	..	300, 600	..	0.40
Kashima	..	JGG	..	..	..	..	..	..
Kashima Maru	..	JKX	..	..	..	300, 600, 1,800	..	0.40
Kasuga	..	JRJ	..	..	..	..	..	..
Katori	..	JGF	..	..	..	..	..	..

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type.).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge
JAPAN—contd.								
Katori Maru **	JKR	Day, 450 ; night, 1200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600, 1,800	P G	N	Francs. 0.40	Francs. —
Kawachi Maru **	JGL	—	Navy	—	O "	—	—	—
Kawachi Maru **	JPC	Day, 200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600, 1,800	P G	N	0.40	—
Kayo Maru **	JKO	Day, 250 ; night, 800	Oaki Goshi Kaisha (Oaki Co.)	300, 600	P G	N	0.40	—
Kinkasan Maru **	JYK	Day, 400	Mitsui Bussan Kaisha	300, 600, 1,800	P G	8 a.m. to 11 a.m., 2 p.m. to 5 p.m., 8 p.m. to mid- night.	0.40	—
Kirishima "	JGW	—	Navy	—	—	—	—	—
Kitano Maru **	JKN	Day, 450 ; night, 1200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600, 1,800	P G	N	0.40	—
Kiyo Maru **	JKY	Day, 250 ; night, 800	Toyo Kisen Kaisha (Oriental S.S. Co.)	300, 600	P G	N	0.40	—
Kobe Maru **	JKB	Day, 300 ; night, 1000	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600	P G	N	0.40	—
Konahashi "	JUU	—	Navy	—	O "	—	—	—
Koma Maru **	JKL	Day, 400 ; night, 1200	Imperial Government Railways	300, 600, 1,800	P G	N	0.40	—
Kongo Kongosan Maru **	JGU JYQ	— Day, 400	Navy Ryoto Kisen Kaisha (Mitsui Bussan Kaisha)	300, 600, 1,800	O " P G	8 a.m. to 11 a.m., 2 p.m. to 5 p.m., 8 p.m. to midnight	— 0.40	—
Korea Maru **	JYL	Day, 500	Toyo Kisen Kaisha (Oriental S.S. Co.)	300, 600, 1,800	P G	N	0.40	—
Kosai Maru "	JKS	Day, 120 ; night, 200	Chosen Government	—	—	—	—	—
Kunajiri Maru **	JKU	Day, 400	Nihon Kaifu Ekisai Kai (Japan Seamen Aid Society)	300, 600	P G	8 a.m. to 11 a.m., 2 p.m. to 5 p.m., 8 p.m. to midnight	0.40	—
Kurama Mandasan Maru **	JGR JYJ	— Day, 400	Navy Mitsui Bussan Kaisha	—	O " P G	8 a.m. to 11 a.m., 2 p.m. to 5 p.m., 8 p.m. to midnight	— 0.40	—
Manila Maru **	JMR	Day, 450 ; night, 1200	Oosaka Shosen Kaisha (Oosaka Mar- cantile Co.)	300, 600, 1,800	P G	N	0.40	—

Mexico Maru ⁸⁸	JMX	Day, 350; night, 1200	Osaka Shosen Kaisha (Osaka Mercantile Co.)	300, 600	P G	..	2 p.m. to 5 p.m., 8 p.m. to midnight	0.40
Mikasa Maru ⁸⁸	JBI	Day, 200	Mitsui Bussan Kaisha	300, 600, 1,800	P G	..	8 a.m. to 11 a.m., 2 p.m. to 5 p.m., 8 p.m. to midnight	0.40
Mikasa	JGC	—	Navy	—	O ..	..	—	—
Mishima	JUL	—	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600	P G	..	N	0.40
Mishima Maru ⁸⁸	JMQ	Day, 450; night, 1200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	—	O ..	..	—	—
Mogami	JWD	—	Navy	—	O ..	..	—	—
Musashi	JUY	—	Navy	—	O ..	..	—	—
Nankai Maru ⁸⁸	JYF	Day, 400	Meiji Kaun Kaisha	300, 600, 1,800	P G	..	8 a.m. to 11 a.m., 2 p.m. to 5 p.m., 8 p.m. to midnight	0.40
Nitaka	JLN	—	Navy	—	O ..	..	—	—
Nikko Maru ⁸⁸	JNL	Day, 450; night, 1200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600, 1,800	P G	..	N	0.40
Nippon Maru ⁸⁸	JNP	Day, 300; night, 1000	Toyo Kisen Kaisha (Oriental S.S. Co.)	300, 600	P G	..	N	0.40
Nisshin .. ¹¹⁸	JRK	—	Navy	300, 600	O ..	..	—	—
Ogasawara Maru ¹¹⁸	JOG	Day, 300; night, 800	Ministry of Communications	—	—	..	—	—
Okinawa Maru ¹¹⁸	JON	Day, 350; night, 1000	Ministry of Communications	300, 600	—	..	—	—
Okinoshima	JUK	—	Navy	—	O ..	..	—	—
Otowa	JLP	—	Navy	—	O ..	..	—	—
Oura Maru ⁸⁸	JYC	Day, 300	Nihon Kaiji Kogyo Kaisha	300, 600, 1,800	P 108	..	8 a.m. to 11 a.m., 2 p.m. to 5 p.m., 8 p.m. to midnight	—
Panama Maru ⁸⁸	JPM	Day, 350; night, 1200	Osaka Shosen Kaisha (Osaka Mercantile Co.)	300, 600	P G	..	N	0.40
Peria Maru ⁸⁸	JPP	Day, 400	Toyo Kisen Kaisha (Oriental S.S. Co.)	300, 600, 1,800	P G	..	N	0.40
Riojun Maru ⁸⁸	JYR	Day, 400	Nanyo Yusen Kaisha	300, 600, 1,800	P G	..	N	0.40
Sado Maru ⁸⁸	JSD	Day, 300; night, 1000	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600	P G	..	N	0.40
Saga JWL	JWL	—	Navy	—	O ..	..	—	—
Sakaki Maru ⁸⁸	JKI	Day, 400; night, 1200	Teikoku Kaiji Kyokwai (Imperial Marine Association)	300, 600	P G	..	N	0.40
Sanuki Maru ⁸⁸	JPS	Day, 400	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600, 1,800	P G	..	N	0.40
Satsuma JGI	IGJ	—	Navy	—	O ..	..	—	—
Seattle Maru ⁸⁸	JST	Day, 350; night, 1200	Osaka Shosen Kaisha (Osaka Mercantile Co.)	300, 600	P G	..	N	0.40
Setsu Maru ⁸⁸	JSY	Day, 400; night, 1000	Toyo Kisen Kaisha (Oriental S.S. Co.)	300, 600	P G	..	N	0.40
Settsu	JGM	—	Navy	—	O ..	..	—	—
Shidzuoka Maru ⁸⁸	JSZ	Day, 350; night, 1200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600	P G	..	N	0.40
Shikishima	JGA	—	Navy	—	O ..	..	—	—

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
JAPAN—contd.								
Shinano Maru ⁸⁹	JSN	Day, 350 ; night, 1200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600	P G	N	Francs. 0.40	Francs. —
Shinbu Maru ⁸⁹	JEB	Day, 400	G. Katsuta	300, 600, 1,800	P G	8 a.m. to 11 a.m., 2 p.m. to 5 p.m., 8 p.m. to midnight	0.40	—
Shinyo Maru JSH ⁸⁸	JSH	Day, 450 ; night, 1500	Toyo Kisen Kaisha (Oriental S.S. Co.)	300, 600	P G	N	0.40	—
Shiragi Maru ⁹⁸	JSK	Day, 350 ; night, 1000	Imperial Government Railways	300, 600, 1,800	P G	N	0.40	—
Siam Maru ⁸⁹	JYX	Day, 200	Osaka Shosen Kaisha (Osaka Mercantile Co.)	300, 600, 1,800	P G	N	0.40	—
Siberia Maru ⁸⁹	JBR	Day, 500 ; night, 1500	Toyo Kisen Kaisha (Oriental S.S. Co.)	300, 600, 1,800	P G	N	0.40	—
Somedono Maru ⁸⁹	JYN	Day, 400	Tatsuuma Kisen Kaisha	300, 600, 1,800	P G	8 a.m. to 11 a.m., 2 p.m. to 5 p.m., 8 p.m. to midnight	0.40	—
Suma	JLL	—	Navy	—	O	—	—	—
Sumida	JWG	—	Navy	—	O	—	—	—
Suwa Maru ⁹⁸	JSU	Day, 450 ; night, 1200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600, 1,800	P G	N	0.40	—
Suwo	IUG	—	Navy	—	O	—	—	—
Tacoma Maru ⁹⁸	JTA	Day, 350 ; night, 1200	Osaka Shosen Kaisha (Osaka Mercantile Co.)	300, 600	P G	N	0.40	—
Taichu Maru ⁹⁸	JTC	Day, 300 ; night, 1000	Osaka Shosen Kaisha (Osaka Mercantile Co.)	300, 600	P G	N	0.40	—
Tainan Maru ⁹⁸	JTN	Day, 300 ; night, 1000	Osaka Shosen Kaisha (Osaka Mercantile Co.)	300, 600	P G	N	0.40	—
Taisei Maru ⁹⁸	JTM	Day, 300 ; night, 1000	Imperial Government (Navigation School)	300, 600	P G	N	0.40	—
Tajima Maru ⁸⁹	JPJ	Day, 400	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600, 1,800	P G	N	0.40	—
Tamba Maru ⁹⁸	JTB	Day, 300 ; night, 1000	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600	P G	N	0.40	—
Tango Maru ⁹⁸	JTG	Day, 450 ; night, 1200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600, 1,800	P G	N	0.40	—
Tatsuno Maru ⁸⁹	JPU	Day, 400	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600, 1,800	P G	N	0.40	—

Tenpaisan Maru ⁸⁰	JPZ	Day, 400	Mitsui Bussan Kaisha	..	300, 600, 1,800	P G	..	8 p.m. to midnight	0.40
Tenyo Maru ⁸⁰	JTY	Day, 450 ; night, 1500	Toyo Kisen Kaisha (Oriental S.S. Co.)	..	300, 600	P G	..	8 a.m. to 11 a.m., 2 p.m. to 5 p.m., 8 p.m. to midnight	0.40
Toba ..	JWK	—	Navy	..	—	O ..	..	—	—
Toba Maru ⁸⁰	JPF	Day 400	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	..	300, 600, 1,800	P G	..	N	0.40
Tokiwa	JRB	—	Navy	..	—	O ..	..	—	—
Tokiwa Maru ⁸⁰	JYW	Day, 400	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	..	300, 600, 1,800	P G	..	N	0.40
Tokushima Maru ⁸⁰	JTQ	Day, 400	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	..	300, 600, 1,800	P G	..	N	0.40
Tokuyama Maru ⁸⁰	JTU	Day, 450 ; night, 1300	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	..	300, 600, 1,800	P G	..	N	0.40
Tone ..	JLF	—	Navy	..	—	O ..	..	—	—
Tosa Maru ⁸⁰	JPT	Day, 400	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	..	300, 600, 1,800	P G	..	N	0.40
Tottori Maru ⁸⁰	JPQ	Day, 200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	..	300, 600, 1,800	P G	..	N	0.40
Toyama Maru ⁸⁰	JTX	Day, 400	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	..	300, 600, 1,800	P G	..	8 a.m. to 11 a.m., 2 p.m. to 5 p.m., 8 p.m. to midnight	0.40
Toyohashi Maru ⁸⁰	JPT	Day, 400	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	..	300, 600, 1,800	P G	..	N	0.40
Toyooka Maru ⁸⁰	JYO	Day, 400	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	..	300, 600, 1,800	P G	..	N	0.40
Tsugaru	JLC	—	Navy	..	—	O ..	..	—	—
Tsuruga Maru ⁸⁰	JPA	Day, 400	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	..	300, 600, 1,800	P G	..	8 a.m. to 11 a.m., 2 p.m. to 5 p.m., 8 p.m. to midnight	0.40
Tsurugisan Maru ⁸⁰	JBL	Day, 400	Mitsui Bussan Kaisha	..	300, 600, 1,800	P G	..	N	0.40
Tsushima	JLO	—	Navy	..	—	O ..	..	—	—
Tsushima Maru JMA ⁸⁰	JMA	Day, 400	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	..	300, 600, 1,800	P G	..	8 a.m. to 11 a.m., 2 p.m. to 5 p.m., 8 p.m. to midnight	0.40
Tsushima Maru JTL ⁸⁰	JTL	Day, 350 ; night, 1000	Imperial Government Railways	..	300, 600, 1,800	P G	..	N	0.40
Tsuyama Maru ⁸⁰	JYM	Day, 400	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	..	300, 600, 1,800	P G	..	8 a.m. to 11 a.m., 2 p.m. to 5 p.m., 8 p.m. to midnight	0.40
Uji	JWF	—	Navy	..	—	O ..	..	—	—
Wakamiya	JUR	—	Navy	..	—	O ..	..	—	—
Wakasa Maru ⁸⁰	JPW	Day, 200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	..	300, 600, 1,800	P G	..	N	0.40
Yahagi ..	JLK	—	Navy	..	—	O ..	..	—	—
Yakumo	JRC	—	Navy	..	—	O ..	..	—	—
Yamashiro	JGO	—	Navy	..	—	O ..	..	—	—
Yanato ..	JUX	—	Navy	..	—	O ..	..	—	—

Ship Stations—Continued

Name.	Calb. Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
JAPAN—contd.								
Yodo	JWC	—	Navy	—	O ..	—	Francs.	Francs.
Yokohama Maru ..	JYH	Day, 350 night, 1,200;	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600	P G	0.40	—	—
Yoshida Maru No. 2 ..	JBY	Day, 400	Yamashita Kisen Kaisha..	300, 600, 1,800	P G	0.40	—	—
Yubari Maru ..	JBU	Day, 400	Hokkaido Tanko Kisen Kaisha..	300, 600, 1,800	P G	0.40	—	—
MEXICO								
Coahuila ..	XBL	—	Compania Mexicana de Nav. S.A.	—	P G	0.40	—	—
General Zaragoza ..	XCA	—	Navy	500	O ..	—	—	—
Jalisco ..	XBK	—	Compania Mexicana de Nav. S.A.	—	P G	0.40	—	—
Mexico XBB ..	XBB	120	Compania Mexicana de Nav. S.A.	300, 600	P G	0.40	—	—
San Antonio ..	XBE	130	Cia. Mexicana de Vap. "San Antonio," S.A.	300, 600	P G	0.40	—	—
San Bernardo ..	XBA	170	Cia. Mexicana de Petroleo "El Aguila," S.A.	300, 600	P G	0.40	—	—
San Cristobal ..	XBI	—	Cia. Mexicana de Petroleo "El Aguila," S.A.	—	P G	0.40	—	—
MONACO								
Hirondelle ..	CQA	380	Prince of Monaco ..	800	P ..	—	—	—
MOROCCO								
Faci ..	CNJ	120	Customs Administration ..	300	O ..	—	—	—
Marrakchi ..	CNM	120	Customs Administration ..	300	O ..	—	—	—
Meknessi ..	CNK	120	Customs Administration ..	300	O ..	—	—	—
Taroudant ..	CNT	120	Customs Administration ..	300	O ..	—	—	—
NEW ZEALAND								
Arabura ..	VMA	Day, 150; night, 400	Union S.S. Co. of New Zealand ..	300, 600	P G	0.20	—	—

Makura ⁸¹	..	..	..	..	..	VLN	250	Union S.S. Co. of New Zealand ..	300, 800	P G	..	X	0.40
Maui	..	..	..	..	..	VLN	325	Union S.S. Co. of New Zealand ..	300, 800	P G	..	X	0.40
Maori VLZ ⁸¹	..	..	..	..	..	VLZ	Day, 250; night, 500	Union S.S. Co. of New Zealand ..	300, 800	P G	..	X	0.40
Marama ⁸¹	..	..	..	..	..	VLG	250	Union S.S. Co. of New Zealand ..	300, 800	P G	..	X	0.40
Maungani ⁸¹	..	..	..	..	..	VLG	250	Union S.S. Co. of New Zealand ..	300, 800	P G	..	X	0.40
Moana ⁸¹	..	..	..	..	..	VMO	325	Union S.S. Co. of New Zealand ..	300, 800	P G	..	X	0.40
Mokoia ⁸¹	..	..	..	..	..	VMK	Day, 250; night, 500	Union S.S. Co. of New Zealand ..	300, 800	P G	..	X	0.40
Monowai ⁸¹	..	..	..	..	..	VMM	Day, 250; night, 500	Union S.S. Co. of New Zealand ..	300, 800	P G	..	X	0.20
Nauva ⁸¹	..	..	..	..	..	VLV	250	Union S.S. Co. of New Zealand ..	300, 800	P G	..	X	0.40
Pahona ⁸¹	..	..	..	..	..	VLY	Day, 250; night, 500	Union S.S. Co. of New Zealand ..	300, 800	P G	..	X	0.40
Talune ⁸¹	..	..	..	..	..	VLL	250	Union S.S. Co. of New Zealand ..	300, 800	P G	..	X	0.40
Tofua ⁸¹	..	..	..	..	..	VLF	250	Union S.S. Co. of New Zealand ..	300, 800	P G	..	X	0.40
Tutaneke ⁸¹	..	..	..	..	..	VLY	325	Government	300, 800	O ..	..	X	—
Wahine ⁸¹	..	..	..	..	..	VLY	Day, 250; night, 500	Union S.S. Co. of New Zealand ..	300, 800	P G	..	X	0.40
ORWAY													
A 1	..	..	..	..	..	LAU	—	Navy	—	O ..	..	—	—
A 2	..	..	..	..	..	LAV	—	Navy	—	O ..	..	—	—
A 3	..	..	..	..	..	LAW	—	Navy	—	O ..	..	—	—
A 4	..	..	..	..	..	LAX	—	Navy	—	O ..	..	—	—
A 5	..	..	..	..	..	LAY	—	Navy	—	O ..	..	—	—
Admiralen ¹⁰⁰	..	..	..	..	..	LDU	110-150	Johann Bryde (Chartered by Crew Levick Co.)	300, 800	P G	..	X	0.40
Aaly ⁸⁰	..	..	..	..	..	LFZ	150-200	A/S Fredrikstad Dampsk (A. Hamnestad)	300, 800	P G	..	X	0.40
Artenis LFW ⁸⁰	..	..	..	..	..	LFW	150-200	Norway Mexico Gulf Line (W. Wilhelmssen)	300, 800	P G	..	X	0.40
Atle Jarl ⁸⁰	..	..	..	..	..	LEY	100-150	Det Nordenfjeldske Dampskibsselskab	300, 800	P G	..	X	0.20
Atna ⁸⁰	..	..	..	..	..	LFC	150-250	Den Norske Afrika-og Australielinje (W. Wilhelmssen)	300, 800	P G	..	X	0.40
Baja California ⁸⁰	..	..	..	..	..	LHC	300	A. O. Lindvig	300, 800	P G	..	X	0.20
Bayard ⁸⁰	..	..	..	..	..	LER	150-200	Akties. Bonheur (F. Olsen)	300, 800	P G	..	X	0.40
Belridge ⁸⁰	..	..	..	..	..	LEF	100-150	Akties. Taunkurt (W. Wilhelmssen)	300, 800	P G	..	X	0.40
Bergensfjord ⁸¹	..	..	..	..	..	LEB	200	Den Norske Amerika-Linje	300, 450, 800	P G	..	N	0.40
Bessa ⁸⁰	..	..	..	..	..	LGI	200-250	Den Norske Afrika-og Australielinje (W. Wilhelmssen)	300, 800	P G	..	X	0.40
Bessheim ⁸⁰	..	..	..	..	..	LDA	160	A/S Ganger Rolf (F. Olsen)	300, 450, 800	P G	..	N	0.28
Björvin	..	..	..	..	..	LBB	—	Navy	—	O ..	..	—	—
Bonna ⁸⁰	..	..	..	..	..	LFX	150-200	Den Norske Afrika-og Australielinje (W. Wilhelmssen)	300, 800	P G	..	X	0.40
Borgestad ¹⁰⁰	..	..	..	..	..	LDZ	150	A/S Borgestad (G. Knudsen)	300, 450, 800	P G	..	X	0.40
Brazil LEQ ⁸⁰	..	..	..	..	..	LEQ	150-200	A/S Ganger Rolf (F. Olsen)	300, 800	P G	..	X	0.40
Breilond ⁸⁰	..	..	..	..	..	LGX	200-250	Sigval Borgesen	300, 800	P G	..	X	0.40
Capto ⁸¹	..	..	..	..	..	LGL	100-150	B. Stolt Nielsen	300, 800	P G	..	X	0.40
Cometa ⁸⁰	..	..	..	..	..	LDS	125	Det Hergenske Dampskibsselskab	300, 800	P G	..	X	0.20
Commonwealth LDD ⁸⁰	..	..	..	..	..	LDD	40	Car. Nielsen & Co.	300, 450, 800	P G	..	X	—
Ciceto ⁸¹	..	..	..	..	..	LGZ	100-150	B. Stolt Nielsen	300, 800	P G	..	X	0.40

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave lengths in Metres (the Normal Wave length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
NORWAY—contd.								
Drammensfjord ⁸⁰	LFL	100-150	Den Norske Amerika-linje	300, 600	P G	X	France. 0.40	France. 4.00
Draug ⁸⁰	LAI	—	Navy	—	O	—	—	—
Eidsvold ⁸⁰	LAA	—	Navy	—	O	—	—	—
Ellida ⁸⁰	LAG	—	Navy	—	O	—	—	—
Ellis ⁸⁰	LAX	350	O. & A. Irgens	300, 600	P G	X	0.40	4.00
Elsa ⁸⁰	LFV	150-200	Den Norske Afrika-og Australie-linje (W. Wilhelmsen)	300, 600	P G	X	0.40	4.00
Bstrella ⁸⁰	LDT	125	Det Bergenske Dampskibsselskab	300, 600	P G	X	0.20	2.00
Fam ⁸⁰	LAH	—	Navy	—	O	—	—	—
Folkvard ⁸⁰	LGA	100-150	Government	300, 600	P G	X	0.40	4.00
Frithjof LAE ⁸⁰	LAE	—	Navy	—	O	—	—	—
Garm ⁸⁰	LBC	—	Navy	—	O	—	—	—
George Washington ⁸⁰	LFQ ⁸⁰	150-200	Petter Olsen	300, 600	P G	X	0.40	4.00
Golaa ⁸⁰	LGM	100-150	F. Siegwarth	300, 600	P G	X	0.40	4.00
Golden Gate ⁸⁰	LGR	435	Knut Knutsen	300, 600	P G	X	0.40	4.00
Governor Forbes ⁸⁰	LHA	300	A. O. Lindvig	300, 600	P G	N	0.20	2.00
Haakon VII. ⁸⁰	LDL	160	Det Nordenfjeldske Dampskibsselskab	300, 450, 600	P G	1 a.m. to 3 a.m., 7 a.m. to 9 a.m., 1 p.m. to 3 p.m., 7 p.m. to 9 p.m.	0.20	2.00
Hamlet ⁸⁰	IGD	160	Brusgaard Kiøsterud & Co.	300, 600	P G	X	0.20	2.00
Hanna Nielsen ⁸⁰	LGI	200-250	B. Stolt Nielsen	300, 600	P G	X	0.40	4.00
Harald Haarfagre	LAB	—	Navy	—	O	—	—	—
Heimdal	LAZ	—	Navy	—	O	—	—	—
Hercules LGY ⁸⁰	LGY	100-150	Norway-Mexico Gulf Line (W. Wilhelmsen)	300, 600	P G	X	0.40	4.00
Hval ⁸⁰	LAN	—	Navy	—	O	—	—	—
Iris LFI ⁸⁰	LFI	120	Det Bergenske Dampskibsselskab	300, 450, 600	P G	X	0.20	2.00
Irma ⁸⁰	LDQ	Day, 240 night 480	Det Bergenske Dampskibsselskab	300, 450, 600	P G	X	0.20	2.00
Jason LEL ⁸⁰	LEL	110	A/S Norsk Bjergningskompagni	300, 600	P G	X	—	—
Jo ⁸⁰	LAQ	—	Navy	—	O	—	—	—
Jonirland ⁸⁰	LEA	100-150	A. F. Borch & Søaner	300, 600	P G	X	0.40	4.00
Jupiter LEB ⁸⁰	LEB	135	Det Bergenske Dampskibsselskab	300, 450, 600	P G	2.30 a.m. to 3 a.m., 8.30 a.m. to 9 a.m., 2.30 p.m. to 3 p.m., 8.30 p.m. to 9 p.m.	0.20	2.00
Kalfarli ⁸⁰	IGF	200-250	D. Steen	300, 600	P G	X	0.40	4.00
Karrakatta ⁸⁰	LDE	40	Chr. Nielsen & Co.	300, 450, 600	P G	X	—	—

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Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
NORWAY—contd.								
Troll	Navy	—	O	—	—	—
Tysfå	150-250	Den Norske Afrika-og Australielinje (W. Wilhelmsen)	300, 600	P G	X	0.40	4.00
Vaadi	200-250	Brødtrene Offtejl ..	300, 600	P G	X	0.40	4.00
Valkyrien LAK	..	—	Navy	—	O	—	—	—
Venus LDO	Day, 240 ; night, 480	Det Bergenske Dampskibsselskab	300, 450, 600	P G	X	0.20	2.00
Viking LAF	..	—	Navy	—	O	—	—	—
Viking LGU	200-250	M. Clausen ..	300, 600	P G	X	0.10	4.00
Vinstra	150-250	Den Norske Afrika-og Australielinje (W. Wilhelmsen)	300, 600	P G	X	0.40	4.00
Wellington LGO	100-150	J. Sæviert	300, 600	P G	X	0.40	4.00
Zetia	150	Det Bergenske Dampskibsselskab	300, 450, 600	P G	X	0.20	2.00
PERU								
Almirante Grau	..	—	Navy	—	—	—	—	—
Chalaco	—	Government	—	—	—	—	—
Constitución	—	Government	—	—	—	—	—
Coronel Bolognesi	..	—	Navy	—	—	—	—	—
Ferré	—	Navy	—	—	—	—	—
Huallaga	250	Cia Peruana Vap y Dique del Callao	300, 600	P G	X	0.40	—
Iquitos	—	Government	—	—	—	—	—
Lima	—	Navy	—	—	—	—	—
Mantaro	250	Cia Peruana Vap y Dique del Callao	300, 600	P G	X	0.40	—
Palacios	—	Navy	—	—	—	—	—
Teniente Rodríguez	..	—	Navy	—	—	—	—	—
Ucayali	250	Cia Peruana Vap y Dique del Callao	300, 600	P G	X	0.40	—
Urubamba	250	Cia Peruana Vap y Dique del Callao	300, 600	P G	X	0.40	—
PORTUGAL								
Adamastor	150	Navy	1300, 450, 600	O	N	—	—
África CSA	160	Empresa Nacional de Navegacao à vapor	300, 450, 600	P G	N	0.40	4.00

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RUSSIA

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Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
RUSSIA.—contd.								
Emperor Peter the Great ⁸⁸	RPP	450	Russian Steam Nav. & Trading Co.	300, 600	P G	2 a.m. to 4 a.m., midday to 2 p.m., 6 p.m. to 8 p.m.	0.40 ⁸⁸	— ⁸⁸
Empress Ekaterina II. ⁸⁸	RPS	450	Russian Steam Nav. & Trading Co.	300, 600	P G	2 a.m. to 4 a.m., midday to 2 p.m., 6 p.m. to 8 p.m.	0.40 ⁸⁸	— ⁸⁸
Erivan ⁸⁸	RNQ	350	Volunteer Fleet	300, 600	P G	5 a.m. to 8 a.m., 1 p.m. to 3 p.m., 8 p.m. to 11 p.m.	0.40 ⁸⁸	— ⁸⁸
Etha Rickmers (ex German vessel—see GERMANY)	—	—	—	—	—	—	—	—
Euphrate RPD ⁸⁸	RPD	450	Russian Steam Nav. & Trading Co.	300, 600	P G	2 a.m. to 4 a.m., ⁷⁰ midday to 2 p.m., 6 p.m. to 8 p.m.	0.40 ⁸⁸	— ⁸⁸
Evstafi	RKA	—	Navy	—	O	—	—	—
Finn	RHL	—	Navy	—	O	—	—	—
Gaidamak	RHC	—	Navy	—	O	—	—	—
General Kondratienko	RHC	—	Navy	—	O	—	—	—
Gheorgii Pobedonosetz	RKI	—	Navy	—	O	—	—	—
Giliak	RGZ	—	Navy	—	O	—	—	—
Giradani	RGF	—	Navy	—	O	—	—	—
Grand Duchess Maria Nikolaevna ^{81, 80}	RNI	200	Volunteer Fleet (Training ship)	600	P	—	0.40 ⁸⁸	— ⁸⁸
Grand Duchess Xenia ⁸⁸	RPG	300	Russian Steam Nav. & Trading Co.	300, 600	P G	Midday to 2 p.m., ⁷⁰ 6 p.m. to 8 p.m., 2 a.m. to 4 a.m.	0.40 ⁸⁸	— ⁸⁸
Grand Duchess Xenia Alexandrovna ⁸⁰	ROD	300	Commercial Nav. School, Odessa	300, 600	P G	2 p.m. to 3 p.m., 8 p.m. to 9 p.m.	—	—
Grand Duke Alexis ⁸⁸	RPQ	300	Russian Steam Nav. & Trading Co.	300, 600	P G	Midday to 2 p.m., ⁷⁰ 6 p.m. to 8 p.m., 2 a.m. to 4 a.m.	0.40 ⁸⁸	— ⁸⁸
Grand Duke Constantine ⁸⁸	RPO	300	Russian Steam Nav. & Trading Co.	300, 600	P G	2 a.m. to 4 a.m., midday to 2 p.m., ⁷⁰ 6 p.m. to 8 p.m.	0.40 ⁸⁸	— ⁸⁸
Gromoboi	RGI	—	Navy	—	O	—	—	—
Herta ⁸⁰	RHE	430	Department of Marine	300, 600, 900	P	—	0.40 ⁸⁸	— ⁸⁸
Ioann Zlatoust	RKC	—	Navy	—	O	—	—	—

[illegible]

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
RUSSIA—cont'd.								
Oka ..	RIC	—	Navy ..	—	O ..	—	Francs.	—
Okvan ..	RGR	—	Navy ..	—	O ..	—	—	—
Oleg ..	RGN	—	Navy ..	—	O ..	—	—	—
Omsk ^{#0} ..	ROM	170	Volunteer Fleet ..	300, 600	P G	7 a.m. to 10 a.m., 1 p.m. to 5 p.m., 7 p.m. to midnight	0.40 ^{#0}	—
Oukraina ..	RHT	—	Navy ..	—	O ..	—	—	—
Ouraletz ..	RKP	—	Navy ..	—	O ..	—	—	—
Oussouriets ..	RHR	—	Navy ..	—	O ..	—	—	—
Oussourri ..	RMD	—	Navy ..	—	O ..	—	—	—
Pamiat Merkouria ..	RKL	—	Navy ..	—	O ..	—	—	—
Pechora ..	RIE	—	Navy ..	—	O ..	—	—	—
Penza ^{#0} ..	RSZ	250	Volunteer Fleet ..	300, 600	P G	5 a.m. to 8 a.m., 1 p.m. to 4 p.m., 8 p.m. to 11 p.m.	0.40 ^{#0}	—
Peter Weliki ^{#0} ..	RPR	110	Committee of the Riga Stock Exchange	300, 600	P G	—	0.40	—
Pogranitchnik ..	RHI	—	Navy ..	—	O ..	—	—	—
Polezny ^{#0} ..	RPZ	100	Russian Steam Nav. & Trading Co.	300, 600	P G	Midday to 2 p.m., 6 p.m. to 8 p.m., 2 a.m. to 4 a.m. ⁷⁰	0.40 ^{#0}	—
Poliarnava Zvezda ^{#0} ..	RFD	—	Government ..	—	O ..	—	—	—
Potemkin Tavricheski ..	RKD	—	Navy ..	—	O ..	—	—	—
Princess Eugenie of Oldenburg ^{#0} ..	RPH	300	Russian Steam Nav. & Trading Co.	300, 600	P G	Midday to 2 p.m., ⁷⁰ 5 p.m. to 8 p.m., 2 a.m. to 4 a.m.	0.40 ^{#0}	—
Prinz Eitel Friedrich (ex-German vessel—see GERMANY)	—	—	—	—	—	—	—	—
Prinzessin Sophie Charlotte (ex-German vessel—see GERMANY)	—	—	—	—	—	—	—	—
Regina (ex-German vessel—see GERMANY)	—	—	—	—	—	—	—	—
Republika ..	RGC	—	Navy ..	—	O ..	—	—	—
Riga ..	RIR	—	Navy ..	—	O ..	—	—	—
Rossia RGL ..	RGL	—	Navy ..	—	O ..	—	—	—
Rossia RSR ^{#0} ..	RSR	200	Russian East Asiatic Co.	300, 600	P G	—	—	—
Russia ..	RSP	—	Navy ..	—	O ..	—	—	—
							0.40 ^{#0}	—

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Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
RUSSIA—contd.								
Vaigatch	O ..	Time of Petrograd. —	Francs. —	Francs. —
Vladimir	..	250	..	300, 600	P G	5 a.m. to 8 a.m., 1 p.m. to 3 p.m., 8 p.m. to 11 p.m.	0.40 "	0.40 "
Voiskovoi	O ..	—	—	—
Vologda	..	170	..	300, 600	P G	7 a.m. to 10 a.m., 1 p.m. to 5 p.m., 7 p.m. to midnight	0.40 "	0.40 "
Voronej	..	250	..	300, 600	P G	5 a.m. to 8 a.m., 1 p.m. to 3 p.m., 8 p.m. to 11 p.m.	0.40 "	0.40 "
Vsadnik.	O ..	—	—	—
Yaroslavl	..	250	..	300, 600	P G	5 a.m. to 8 a.m., 1 p.m. to 3 p.m., 8 p.m. to 11 p.m.	0.40 "	0.40 "
Zabaikalsk	..	—	..	—	O ..	—	—	—
SIAM								
Bali HGC	..	—	..	300, 600	O ..	—	—	—
Sua Kamrainsindhu	..	—	..	300, 600	O ..	—	—	—
Sua Tavanchol.	..	—	..	300, 600	O ..	—	—	—
Trautensfels (ex German vessel —see GERMANY)	..	—	..	—	O ..	—	—	—
SOUTH AFRICA (UNION OF)								
Ludwig Wiener	..	100	..	300, 600	O ..	—	—	—
SPAIN								
Adelina	..	—	..	300, 600	P G	X	0.30	3.00
Adolfo	..	150-200	..	300, 600	P G	X	0.30	3.00
Alava	300, 600	P G	X	0.30	3.00
A. Lazaro	..	180	..	300, 450, 600	P G	X	0.30	3.00
Alfonso XIII	..	260	..	600	P G	N	0.30	3.00

Alfonso XIII. EDT ¹¹	269	EDT	Compañía Trasatlántica ..	1,500, 1,800	P G	..	..	..	0.30	3.00
Alicante ¹¹	269	EDA	Compañía Trasatlántica ..	300, 600	P G	..	..	..	0.30	3.00
Almirante Lobo ¹¹⁰	140	EBN	Government ..	300, 600, 900	O ..	..	..	..	—	—
Alvaro de Bazán	81	EBM	Navy ..	300, 600	O ..	..	..	..	—	—
Andalucía ¹¹	100-150	EED	Cia. Trasmediterranea ..	300, 600	P G	..	..	..	0.30	3.00
Angel B. Perez ¹¹	269	EDL	Compañía Trasatlántica ..	300, 600	P G	..	..	..	0.30	3.00
Antonia Lopez ¹¹	—	CMA	Cia. Anon. Marítima Union ..	300, 600	P G	..	..	..	0.30	3.00
Apolo ¹¹	—	EBM	Cia. Trasmediterranea ..	300, 600	P G	..	..	..	0.30	3.00
Aragón ¹¹	—	ECU	Compañía Nav. Sota y Aznar ..	300, 600	P G	..	..	..	0.30	3.00
Artagan Mendi ¹¹	—	CXU	Hijos de Jose Taya S. en C. ..	300, 600	P G	..	..	..	0.30	3.00
Asturias ¹¹	—	CMC	Cia. Trasmediterranea ..	300, 600	P G	..	..	..	0.30	3.00
Atlanta ¹¹	—	EFA	Navy ..	300, 600	P G	..	..	..	0.30	3.00
Audaz ..	180	EHQ	Cia. Trasmediterranea ..	300, 450, 600	O P G	..	..	..	—	—
Ausias March ¹¹	100	FEA	Islaña Marítima Compañía ..	300, 450, 600	P ..	..	..	..	0.30	3.00
Balcas ⁸⁰	275	EFR	Pinillos Izquierdo y Compañía ..	300, 450, 600	P ..	..	..	..	0.30	3.00
Balmes ¹¹	180	ECA	Cia. Trasmediterranea ..	300, 450, 600	P G	..	..	..	0.30	3.00
Barcelona ECB ¹¹	300	ECB	Pinillos Izquierdo y Compañía ..	300, 450, 600	P G	..	..	..	0.30	3.00
Beñer ⁸⁰	200	EFB	Islaña Marítima Compañía ..	300, 400, 600	P ..	..	..	..	—	—
Bonifaz ..	228	EBR	Navy ..	300, 450, 600	Q ..	..	..	..	—	—
Buenos Aires EDB ¹¹	269	EDB	Compañía Trasatlántica ..	300, 600	P G	..	..	..	0.30	3.00
Bustamante ..	140	EBO	Navy ..	300, 450, 600	Q ..	..	..	..	—	—
Cabañal ¹¹	180	EEC	Cia. Trasmediterranea ..	300, 450, 600	P G	..	..	..	0.30	3.00
Cabo Cervera ¹¹	—	ECU	Ybarra & Co. ..	300, 600	P G	..	..	..	0.30	3.00
Cabo Tres Forcas ¹¹	140	ECK	Ybarra & Co. ..	300, 600	P G	..	..	..	0.30	3.00
Cadarso ¹¹	—	EBQ	Navy ..	300, 450, 600	O ..	..	..	..	—	—
Cádiz ¹¹	300	ECC	Pinillos Izquierdo y Compañía ..	300, 450, 600	P G	..	..	..	0.30	3.00
Canalejas ¹¹	100-150	EEK	Cia. Trasmediterranea ..	300, 600	P G	..	..	..	0.30	3.00
Carolina E. de Perez ¹¹	—	EEF	A. F. Perez ..	300, 600	P G	..	..	..	0.30	3.00
Castilla ¹¹	—	EBQ	Cia. Trasmediterranea ..	300, 600	P G	..	..	..	0.30	3.00
Cataluña ¹¹	300	ECI	Pinillos Izquierdo y Compañía ..	300, 450, 600	P G	..	..	..	0.30	3.00
Cataluña EBF ¹¹	210	EBF	Navy ..	300, 450, 550	O ..	..	..	..	—	—
Cataluña EDC ¹¹	168	EDC	Compañía Trasatlántica ..	300, 600	P ..	..	..	..	0.30	3.00
Cataluña EFC ⁸⁰	100	EFC	Islaña Marítima Compañía ..	300, 400, 600	P ..	..	..	..	0.30	3.00
Ciudad de Cádiz ¹¹	108	EDH	Compañía Trasatlántica ..	300, 600	P G	..	..	..	0.30	3.00
C. Lopez y Lopez ¹¹	269	EDH	Compañía Trasatlántica ..	300, 600	P G	..	..	..	0.30	3.00
Conde Witredo ¹¹	300	ECW	Pinillos Izquierdo y Compañía ..	300, 450, 600	P G	..	..	..	0.30	3.00
Delfin CLD ..	—	CLD	Navy ..	—	O ..	..	..	..	—	—
Delfin EFD ¹¹	—	EFD	Cia. Trasmediterranea ..	300, 600	P G	..	..	..	0.30	3.00
Dorado ..	—	CLE	Navy ..	300, 450, 600	O ..	..	..	..	—	—
Emilia S. de Perez ¹¹	300	ECE	A. F. Perez ..	300, 750	P G	..	..	..	0.30	3.00
Emperador Carlos V.	243	EBE	Navy ..	300, 600	O ..	..	..	..	—	—
Eolo ¹¹	—	CME	Cia. Anon. Marítima Union ..	600, 800, 1,200	P G	..	..	..	0.30	3.00
España ¹¹	550	EBA	Navy ..	1,500, 1,800	O ..	..	..	..	—	—
Extremadura EBJ ¹¹	43	EBI	Navy ..	300, 525	O ..	..	..	..	—	—
Faustino R. San Pedro ¹¹	130	CMD	Altos Hornos de Vizcaya ..	300, 600	P G	0.30	3.00
Francoli ¹¹	—	EFF	Cia. Trasmediterranea ..	300, 600	P G	0.30	3.00

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Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
SPAIN—contd.								
Torpedero No. 4	EHD	—	Navy	—	O ..	—	Francs.	Francs.
Torpedero No. 5	EHE	—	Navy	—	O ..	—	—	—
Torpedero No. 6	EHF	—	Navy	—	O ..	—	—	—
Torpedero No. 7	EHG	—	Navy	—	O ..	—	—	—
Torpedero No. 8	EHH	—	Navy	—	O ..	—	—	—
Torpedero No. 9	EHI	—	Navy	—	O ..	—	—	—
Torpedero No. 10	EHL	—	Navy	—	O ..	—	—	—
Torpedero No. 11	EHL	—	Navy	—	O ..	—	—	—
Torpedero No. 12	EHL	—	Navy	—	O ..	—	—	—
Torpedero No. 13	EHL	—	Navy	—	O ..	—	—	—
Torpedero No. 14	EHL	—	Navy	—	O ..	—	—	—
Torpedero No. 15	CLA	—	Navy	—	O ..	—	—	—
Torpedero No. 16	CLB	—	Navy	—	O ..	—	—	—
Torpedero No. 17	CLC	—	Navy	—	O ..	—	—	—
Torpedero No. 17	CLC	130	Navy	300, 600	O ..	—	—	—
Portablanca ¹¹	EFU	250	Cia Trasmediterranea	300, 450, 600	P G	X N	0.30 0.30	3.00 3.00
Turia ¹¹	EFU	250	Cia Trasmediterranea	300, 450, 600	P G	X N	0.30 0.30	3.00 3.00
Valbanera ¹¹	ECV	300	Pinillos Izquierdo y Compañia	300, 450, 600	P G	N	0.30	3.00
Vicente Ferrer ¹¹	EEF	100	Cia Trasmediterranea	300, 600	P G	N	0.30	3.00
Vicente La Roda ¹¹	EEF	180	Cia Trasmediterranea	300, 600	P G	N	0.30	3.00
Victor de Chavarri ¹¹	CMG	—	Altos Hornos de Vizcaya	300, 600	P G	X	0.30	3.00
Villamil	EBP	140	Navy	300, 450, 600, 900	O ..	N	—	—
Villarreal ¹¹	EBW	180	Cia Trasmediterranea	300, 600	P G	N	0.30	3.00
V. V. Puchol ¹¹	EBP	180	Cia Trasmediterranea	300, 600	P G	N	0.30	3.00
Yutei ¹¹	EDE	—	Cia Nav. gul Puzcuana	300, 600	P G	X	0.30	3.00
SWEDEN								
Abisko ¹²	SFL	150	Trafikaaktiebolaget Grängesberg-Oxelösund	300, 450, 600	P ..	Greenwich time. 8 a.m. to 8.15 a.m., midday to 12.15 p.m., 4 p.m. to 4.15 p.m., 8 p.m. to 8.15 p.m. — ¹²	0.40	4.00
Æolus SHC ¹³	SHC	100	Stockholms Rederiaktiebolag Svea (Tralleborg-Sassnitz Line)	300, 600	P G	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m. — ¹²	0.28	2.80
Atracante ¹³	SFS	250	Rederiaktiebolaget Transatlantic	300, 600	P —	—	0.40	4.00

Atlantic ^{es}	..	..	SFT	250	Rederiaktiebolaget Transatlantic	300, 600	P ..	..	3 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to midnight 3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to midnight	[0.40	4.00
Australic ^{es}	..	..	SFH	250	Rederiaktiebolaget Transatlantic	300, 600	P ..	..	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to midnight	0.40	4.00
Axel Johnson ^{es}	..	..	SGK	350	Rederiaktiebolaget Nordstjeran (Johnson Line)	300, 600	P ..	..	6 a.m. to 7 a.m., 11 a.m. to midday, 11 a.m. to midday, 2 p.m. to 3 p.m., 6 p.m. to 7 p.m.	0.25	2.80
Balder ^{es}	..	..	SGO	200	Angf. Aktieb. "Thule"	300, 600	P G	..	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to midnight	0.40	2.80
Baltic SFU ^{es}	..	..	SFU	250	Rederiaktiebolaget Transatlantic	300, 600	P ..	..	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to midnight	0.40	4.00
Bele ^{es}	..	..	SGP	200	Angf. Aktieb. "Thule"	300, 600	P G	..	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to midnight	0.40	2.80
Bia ^{es}	..	..	SFR	250	Rederiaktiebolaget Transatlantic	300, 600	P ..	..	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to midnight	0.40	.00
Birger Jarl ^{es}	..	..	SHD	100	Stockholms Rederiaktiebolag Svea	300, 600	P G	..	8 a.m. to 8.15 a.m., midday to 12.15 p.m., 4 p.m. to 4.15 p.m., 8 p.m. to 8.15 p.m.	0.28	2.80
Blenda ..	..	..	SBX	—	Navy	—	O ..	..	—	—	—
Boden ^{es}	..	..	SFW	150	Trafikaktiebolaget Grängesberg- Oxelösund	300, 600	P ..	..	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to midnight	0.40	4.00
Bolmen ^{es}	..	..	SHA	250	Rederiaktiebolaget Transatlantic	300, 600	P ..	..	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to midnight	0.40	4.00

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
SWEDEN—contd.								
Carlsholm ⁴⁸ ..	SGR	350	Svenska Amerika-Mexico Linjen	300, 600	P G ..	Greenwich time. 8 a.m. to 8.30 a.m., midday to 12.30 p.m., 8 p.m. to 8.30 p.m.	Francs. 0.40	Francs. 4.00
Ceylon ⁴⁸ ..	SGY	350	Swedish East Asiatic Co. ..	300, 600	P ..	8 a.m. to 8.30 a.m., midday to 12.30 p.m., 8 p.m. to 8.30 p.m.	0.40	4.00
Claes Horn ..	SBC	—	Navy ..	—	O ..	—	—	—
Clas Fleming ..	SCI	—	Navy ..	—	O ..	—	—	—
Dristigheten ..	SRG	—	Navy ..	—	O ..	—	—	—
Drott .. ^{48 49} ..	SBW	—	Government ..	—	O ..	—	—	—
Drottning Viktoria ..	SEB	100	State Railways (Sassnitz-Träl- borg Line)	300, 375, 600	P R ³⁵ O ³⁴ ..	X	— ³⁷	— ³⁷
Edda .. ⁴⁸ ..	SBV	—	Navy ..	—	O ..	—	—	—
Formosa ⁴⁸ ..	SGA	350	Swedish East Asiatic Co. ..	300, 600	P G ..	6 a.m. to 7 a.m., 11 a.m. to midday, 2 p.m. to 3 p.m., 6 p.m. to 7 p.m.	0.40	4.00
Fylgia .. ^{48 49} ..	SPM SGV	— 100	Navy .. Rederiaktiebolaget Transatlantic	— 300, 600	O .. P ..	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to midnight	— 0.40	— 4.00
Göta .. ^{48 49} ..	SBB SGH	— 160	Navy .. Stockholms Rederiaktiebolag Svea	— 300, 600	O .. P ..	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to mid- night	— 0.28	— 2.80
Heimdall SGH ^{48 49} ..	—	—	—	—	—	—	—	—
Hellenic ⁴⁸ ..	SFF	250	Rederiaktiebolaget Transatlantic	300, 600	P ..	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m.	0.40	4.00

Jacob Bagge Japan ⁶⁸	.. ..	SBP SGX	— 350	Navy Swedish East Asiatic Co.	.. ..	— 300, 600	O .. P ..	.. ..	3 a.m. to 8 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to midnight	— 4.00	0.40	4.00
John Ericsson Konung Gustaf V. ^{80 80}	.. ..	SBN SEA	— 100	Navy State Railways (Sassnitz-Träl- borg Line)	.. ..	— 300, 375, 600	O .. P ..	.. ..	8 a.m. to 8.30 a.m., midday to 12.30 p.m., 8 p.m. to 8.30 p.m.	— 4.00	0.40	4.00
Kratos ⁶⁸	.. ..	FQ	250	Rederiaktiebolaget Transatlantic	.. ..	300, 800	P ..	.. ..	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to mid- night.	— 4.00	0.40	4.00
Kronprinsessan Margareta ^{80 81}	.. ..	SFY	350	Rederiaktiebolaget (Johnson Line)	Nordstjernen	300, 800	P ..	.. ..	6 a.m. to 7 a.m., 11 a.m. to midday, 2 p.m. to 3 p.m., 6 p.m. to 7 p.m.	2.80	0.28	2.80
Kronprinsessan Victoria ⁸⁰	.. ..	SGB	350	Rederiaktiebolaget (Johnson Line)	Nordstjernen	300, 800	P ..	.. ..	6 a.m. to 7 a.m., 11 a.m. to midday, 2 p.m. to 3 p.m., 6 p.m. to 7 p.m.	2.80	0.28	2.80
Kronprins Gustaf Adolf ^{80 81}	.. ..	SFV	350	Rederiaktiebolaget (Johnson Line)	Nordstjernen	300, 800	P ..	.. ..	6 a.m. to 7 a.m., 11 a.m. to midday, 2 p.m. to 3 p.m., 6 p.m. to 7 p.m.	2.80	0.28	2.80
Magne ⁸⁰	.. ..	SBZ SED	— 100	Navy State Railways (Malmo-Copen- hagen Line)	.. ..	— 300, 375, 600	O .. O ..	.. ..	8 a.m. to 8.15 a.m., midday to 12.15 p.m., 4 p.m. to 4.15 p.m., 8 p.m. to 8.15 p.m.	— 4.00	0.40	4.00
Manligheten	.. ..	SBK	—	Navy	.. ..	—	O ..	.. ..	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to mid- night.	— 4.00	0.40	4.00
Mode ⁸⁰	.. ..	SBY	—	Navy	.. ..	—	O ..	.. ..	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to mid- night.	— 4.00	0.40	4.00
Munin	.. ..	SCF	—	Navy	.. ..	—	O ..	.. ..	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to mid- night.	— 4.00	0.40	4.00
Narvik ⁶⁸	.. ..	SFX	150	Trafikaktiebolaget Oxelösund	Grängesberg	300, 600	P ..	.. ..	8 a.m. to 8.15 a.m., midday to 12.15 p.m., 4 p.m. to 4.15 p.m., 8 p.m. to 8.15 p.m.	— 4.00	0.40	4.00
Njord	.. ..	SBF	—	Navy	.. ..	—	O ..	.. ..	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to mid- night.	— 4.00	0.40	4.00
Nordic ⁶⁸	.. ..	SGG	250	Rederiaktiebolaget Transatlantic	.. ..	300, 800	P ..	.. ..	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to mid- night.	— 4.00	0.40	4.00

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
SWEDEN—contd.								
Oaxen V. ⁸⁰ 114	SGN	100	Aktiebolaget Karta & Oaxens Kalkbruk	300, 600	P ..	X	—	—
Oden ..	SBD	—	Navy ..	—	O ..	—	—	—
Ornen ..	SRO	—	Navy ..	—	O ..	—	—	—
Oscar II. SBL ..	SBL	—	Navy ..	—	O ..	—	—	—
Pacific SFZ ⁸⁰ 91	SFZ	350	Rederiaktiebolaget Nordstjernan (Johnson Line)	300, 600	P ..	6 a.m. to 7 a.m., 11 a.m. to midday, 2 p.m. to 3 p.m., 6 p.m. to 7 p.m.	0.28	2.80
Pedro Christophersen ⁸⁰ 91	SGE	350	Rederiaktiebolaget Nordstjernan (Johnson Line)	300, 600	P ..	6 a.m. to 7 a.m., 11 a.m. to midday, 2 p.m. to 3 p.m., 6 p.m. to 7 p.m.	0.28	2.80
Prinsessan Ingeborg ⁸⁰	SHB	350	Rederiaktiebolaget Nordstjernan (Johnson Line)	300, 600	P ..	6 a.m. to 7 a.m., 11 a.m. to midday, 2 p.m. to 3 p.m., 6 p.m. to 7 p.m.	0.28	2.80
Psilander	SBS	—	Navy ..	—	O ..	—	—	—
Ragnar ..	SCB	—	Navy ..	—	O ..	—	—	—
Rota ..	SBT	—	Navy ..	—	O ..	—	—	—
Saga SFB ⁸⁰	SFB	150	Angf. Aktieb. "Thule" ..	300, 600	PG	N	0.28	2.80
Sagoland ⁸⁰	SGM	350	Angfartyssaktiebolaget Tirfing ..	300, 600	P ..	8 a.m. to 8.30 a.m., midday to 12.30 p.m., 8 p.m. to 8.30 p.m.	0.40	4.00
San Francisco SGC ⁸⁰ 91	SGC	350	Rederiaktiebolaget Nordstjernan (Johnson Line)	300, 600	P ..	6 a.m. to 7 a.m., 11 a.m. to midday, 2 p.m. to 3 p.m., 6 p.m. to 7 p.m.	0.28	2.80
Sigurd ..	SCC	—	Navy ..	—	O ..	—	—	—
Siljan ⁸⁰ ..	SGJ	250	Rederiaktiebolaget Transatlantic	300, 600	P ..	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to midday	0.40	4.00

Skagerak 80 118	..	..	SEC	70	Government,	300, 600	P ..	..	4.15 p.m., 8 p.m. to 8.15 p.m. 6.30 a.m. to 7.30 a.m., 9.30 a.m. to 11.30 a.m., 2.30 p.m. to 3.30 p.m., 4.30 p.m. to 5.30 p.m.	—	—	—
Skagerr 83	..	..	SGU	250	Rederiaktiebolaget Transatlantic	300, 600	P ..	..	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to midnight	0.40	0.40	4.00
Skäggald	..	..	SCJ	—	Navy	—	O ..	..	—	—	—	—
Skuld .. u	..	..	SBU	—	Navy	—	O ..	..	—	—	—	—
Stockholm ..	..	..	SGL	250	Rederiaktiebolaget Sverige-Nord-Amerika	300, 600	P G	..	N	0.40	0.40	4.00
Suecia 80 91	..	..	SGT	350	Rederiaktiebolaget Nordstjernan (Johnson Line)	300, 600	P G	..	6 a.m. to 7 a.m., 11 a.m. to midday, 2 p.m. to 3 p.m., 6 p.m. to 7 p.m.	0.28	0.28	2.80
Sumatra SGD 88	..	..	SGD	350	Swedish East Asiatic Co.	300, 600	P G	..	8 a.m. to 8.30 a.m., midday to 12.30 p.m., 8 p.m. to 8.30 p.m.	0.40	0.40	4.00
Svea ..	..	..	SBA	—	Navy	—	O ..	..	—	—	—	—
Svenskund ..	..	..	SCK	—	Navy	—	O ..	..	—	—	—	—
Sverige ..	..	..	SCL	—	Navy	—	O ..	..	—	—	—	—
Sydre 88	..	..	SGF	250	Rederiaktiebolaget Transatlantic	300, 600	P ..	..	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to midnight	0.40	0.40	4.00
Tapperheten	..	..	SBJ	—	Navy	—	O ..	..	—	—	—	—
Tasmanic 88	..	..	SFG	250	Rederiaktiebolaget Transatlantic	300, 600	P ..	..	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to midnight	0.40	0.40	4.00
Texas SFD 88	..	..	SFD	200	Svenska Amerika-Mexico Linjen..	300, 800 I	P ..	..	Midnight to 12.15 a.m., 4 a.m. to 4.15 a.m., 8 a.m. to 8.15 a.m., midday to 12.15 p.m., 4 p.m. to 4.15 p.m., 8 p.m. to 8.15 p.m.	0.40	0.40	4.00

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
SWEDEN—contd.								
Thor ..	SBE	—	Navy ..	—	O ..	—	—	—
Thorsdön ..	SGH	—	Navy ..	—	O ..	—	—	—
Thorsten ..	SGO	200	Angl. Aktieb. "Thule" ..	300, 600	P G ..	N	0.40	2.80
Thule SBC ..	SBC	—	Navy ..	—	O ..	N	—	—
Thule SRC ..	SFC	150	Angl. Aktieb. "Thule" ..	300, 600	P G ..	N	0.28	2.80
Tirling ..	SCG	—	Navy ..	—	O ..	—	—	—
Torne ..	SFJ	150	Trafikaktiebolaget Grängesberg-Oxelösund ..	300, 450, 600	P ..	8 a.m. to 8.15 a.m., midday to 12.15 p.m., 4 p.m. to 4.15 p.m., 8 p.m. to 8.15 p.m.	0.40	4.00
Valparaiso ..	SGW	350	Rederiaktiebolaget Nordstjernen (Johnson Line) ..	300, 600	P ..	6 a.m. to 7 a.m., 11 a.m. to midday, 2 p.m. to 3 p.m., 6 p.m. to 7 p.m.	0.28	2.80
Vidar ..	SCD	—	Navy ..	—	O ..	—	—	—
Vollrath Tham ..	SFO	150	Trafikaktiebolaget Grängesberg-Oxelösund ..	300, 600	P ..	8 a.m. to 8.15 a.m., midday to 12.15 p.m., 4 p.m. to 4.15 p.m., 8 p.m. to 8.15 p.m.	0.40	4.00
Wae ..	SCA	—	Navy ..	—	O ..	—	—	—
Wasa ..	SBI	—	Navy ..	—	O ..	—	—	—
Yeddo ..	SHF	350	Swedish East Asiatic Co. ..	300, 600	P ..	8 a.m. to 8.30 a.m., midday to 12.30 p.m., 8 p.m. to 8.30 p.m.	0.40	4.00
UNITED STATES OF AMERICA								
A. 2 NXB ¹²⁵ ..	NXB	—	Navy ..	300, 600	P G ..	N	0.20	—
A. 3 NXC ¹²⁵ ..	NXC	—	Navy ..	300, 600	P G ..	N	0.20	—
A. 4 NXD ¹²⁵ ..	NXD	—	Navy ..	300, 600	P G ..	N	0.20	—
A. 5 NXE ¹²⁵ ..	NXE	—	Navy ..	300, 600	P G ..	N	0.20	—
A. 6 NXF ¹²⁵ ..	NXF	—	Navy ..	300, 600	P G ..	N	0.20	—
A. 7 NXG ¹²⁵ ..	NXG	—	Navy ..	300, 600	P G ..	N	0.20	—
Abangarez ¹¹⁸ ..	KDI	500	Abangarez Steamship Corporation ..	300, 600	P G ..	N	0.40	—

KPT	..	..	500	Panama Railroad Co.	..	300, 450, 600, 750, 950, 1,200	N	0.20
NTJ	..	..	150	Standard Transportation Co.	..	300, 800	X	0.20 101 0.40 102
NRU	..	..	75	Navy	..	300, 800	N	0.20
NTI	..	..	—	U.S. Revenue Cutter Service	..	300, 800	N	0.20
—	..	..	—	Navy	..	300, 800	N	0.20
WHS	..	..	150	Inter-Ocean Transportation Co.	..	300, 800	X	0.20 101 0.40 102
WAY	..	..	100	Pacific Alaska Nav. Co.	..	300, 800	N	0.20
WAB	..	..	250	Pacific Alaska Nav. Co.	..	300, 800	N	0.20
WAF	..	..	100	Pacific Alaska Nav. Co.	..	300, 450, 515, 600	N	0.20
WRJ	..	..	200	Pacific Alaska Nav. Co.	..	300, 440, 520, 600	N	0.20
WAZ	..	..	100	Pacific Alaska Nav. Co.	..	300, 800	N	0.20
WAG	..	..	—	Pacific Alaska Navigation Co.	..	300, 800	—	—
WSF	..	..	150	Pacific Steamship Co.	..	300, 800	N	0.20
WAW	..	..	300	Pacific Alaska Nav. Co.	..	300, 450, 800	N	0.20
KMV	..	..	—	Panama Railroad Co.	..	300, 450, 600	—	—
—	—	—	..	—	—	—
NVO	..	..	—	Navy	..	300, 600	N	0.20
NBH	..	..	—	Navy	..	300, 600	X	0.20 124
KUN	..	..	200	The Texas Co.	..	300, 800	N	0.20
NBI	..	..	—	Navy	..	300, 800	N	0.20 134
WFB	..	..	150	Goodrich Transit Co.	..	300, 800	N	0.10
WKZ	..	..	200	Garland Steamship Corporation	..	300, 450, 600	X	0.20 101 0.40 102
WAA	..	..	100	Alaska S.S. Co.	..	300, 800	N	0.20
KEJ	..	..	200	Mallory S.S. Co.	..	300, 450, 600	N	0.20 101 0.40 102
WWS	..	..	150	Alaska S.S. Co.	..	300, 435, 510, 600	N	0.20
WKA	..	..	200	American Hawaiian S.S. Co.	..	300, 800	X	0.20 101 0.40 102
NBY	..	..	—	Navy	..	300, 800	—	—
NOV	..	..	200	Navy	..	300, 800	X	0.20 134
KZA	..	..	200	Fred Gilbert Bourne	..	300, 600 1,800	—	0.20 101 0.40 102
NBL	..	..	—	Navy	..	300, 800	N	0.20 134
KVG	..	..	200	Clyde S.S. Co.	..	300, 450, 600	—	0.20 101 0.40 102
NRA	..	..	150	U.S. Revenue Cutter Service	..	300, 800	N	0.20
NTM	..	..	—	Navy	..	300, 800	N	0.20
KZB	..	..	60	Alfred I. du Pont	..	300, 800	X	0.20
WNK	..	..	100	Northland S.S. Co.	..	300, 800	N	0.20 101 0.40 102

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Meters (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
UNITED STATES OF AMERICA—cont'd.								
Allemania (ex German vessel—see GERMANY)	—	—	—	—	—	—	Francs.	Francs.
Allen 125	NID	—	Navy	300, 600	P G	—	0.20	—
Alliance 80	KMA	300	Panama Railroad Co.	300, 450, 600	P G	N	0.20	0.10
Alliance 76	WRV	100	Fair & Moran	300, 600	P G	N	0.40	0.10
Almirante 113	KLD	500	Almirante S.S. Corporation (United Fruit Co.)	300, 600	P G	N	0.40	—
Aloha 4 80	KYH	200	Arthur Curtiss James	300, 450, 600	P G	X	0.20	—
Alpena 76 107	WCS	—	Wyandotte Transportation Co.	300, 600	P G	—	0.10	—
Alvina 80	WEY	300	Thomas F. Cole	300, 600	P ..	X	0.20	0.10
Amazonia 76	KOO	200	R. Lawrence Smith (Inc.)..	300, 450, 600	P G	X	0.20	0.10
America (ex Amerika—see GERMANY)	—	—	—	—	—	—	—	—
American WKF 80	WKF	200	American Hawaiian S.S. Co.	300, 600	P G	X	0.20	0.10
Amnien 125	NRP	—	Navy	300, 600	P G	—	0.40	0.10
Amolco 80	KMB	—	Boston Molasses Co.	300, 600	P G	—	0.20	0.10
Amphitrite NHG	NIIG	—	Naval Militia	300, 600	P G	X	—	—
Aucon 80	KMS	300	Panama Railroad Co.	300, 400, 600	P G	N	0.20	—
Andalusia (ex-German vessel—see GERMANY)	—	—	—	—	—	—	—	—
Androscoquin 137	NRD	150	U.S. Revenue Cutter Service	300, 600	P G	—	0.20	—
Annapolis 125	NJR	—	Navy	300, 600	P G	N	0.20	0.10
Ann Arbor No. 3 105 123 76	WDN	125	Ann Arbor Railroad Co.	300, 600	P G	X	0.10	—
Ann Arbor No. 4 105 123 76	WDO	125	Ann Arbor Railroad Co.	300, 600	P G	X	0.10	—
Ann Arbor No. 5 105 123 76	WDP	125	Ann Arbor Railroad Co.	300, 600	P G	X	0.10	—
Ann Arbor No. 6 105 123 76	WDO	100	Ann Arbor Railroad Co.	300, 600	P G	X	0.10	—
Anne W.	WMU	—	Hosford Transportation Co.	300, 600	P G	—	—	—
Apache KVA 76	KVA	200	Clyde S.S. Co.	300, 450, 600	P G	N	0.20	0.10
Apache NRP 127	NRP	100	U.S. Revenue Cutter Service	300, 600	P G	N	0.40	0.10
Apache NIN 128	NIN	200	Navy	300, 600	P G	N	0.20	—
Arapahoe KVB 76	KVB	—	Clyde S.S. Co.	300, 450, 600	P G	N	0.20	0.10
Arapahoe NSP 128	NSP	—	Navy	300, 600	P G	N	0.40	0.20

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Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
UNITED STATES OF AMERICA—contd.								
Beale ¹²⁵	NCL	—	Navy	300, 600	P G	—	Francs.	Francs.
Bear ¹²⁷	NRB	150	U.S. Revenue Cutter Service	300, 600	P G	N	0.20	0.20
Beaver WWB ⁷⁶	WWB	200	San Francisco & Portland S.S. Co.	300, 600	P G	N	0.20	0.20 ¹⁰¹
Belfast ⁷⁶	KRD	200	Eastern S.S. Corporation	300, 600	P G	X	0.20	0.40 ¹⁰²
Benham ¹²⁵	NIJ	—	Navy	300, 600	P G	—	0.20	0.20 ¹²⁴
Benjamin Brewster ⁷⁶	KPS	—	Standard Oil Co. (New Jersey)	300, 600	P G	—	0.20	0.20 ¹⁰¹
Benjamin F. Packard ^{24 80}	WLA	100	Northwestern Fisheries Co.	300, 450, 525, 600	P G	X	0.40	0.40 ¹⁰³
Berlin WRB ^{76 86}	WRB	100	Alaska Portland Packers' Association	300, 600	P G	X	0.20	0.20 ¹⁰¹
Biddle ¹²⁶	NVW	—	Navy	300, 600	P G	N	0.40	0.40 ¹⁰²
Birmingham NCN ¹²⁵	NCN	—	Navy	300, 600	P G	—	0.20	0.20 ¹²⁴
Blackely ¹²⁶	NVX	—	Navy	300, 600	P G	N	0.20	0.20 ¹²⁴
Bochum (ex-German vessel—see GERMANY)	—	—	—	—	—	—	—	—
Bohemia (ex-German vessel—see GERMANY)	—	—	—	—	—	—	—	—
Boston KXA ¹²⁶	KXA	50	New England S.S. Co.	300, 550, 600	P G	N	0.15	0.15
Boston NGC ¹²⁵	NGC	—	Navy	300, 600	P G	N	0.20	0.20
Boxer ¹²⁶	NSY	—	Navy	300, 600	P G	N	0.20	0.20
Brabant ⁷⁶	KUU	200	The Texas Co.	300, 450, 600	P G	X	0.20	0.20 ¹⁰¹
Bradford ⁷⁶	KNG	200	Standard Oil Co. (New Jersey)	300, 450, 600	P G	X	0.40	0.40 ¹⁰²
Bramell Point ⁷⁶	KRO	105	Vacuum Oil Co.	300, 450, 600	P G	X	0.20	0.20 ¹⁰¹
Brazos ⁷⁶	KEZ	200	Mallory S.S. Co.	300, 450, 600	P G	N	0.40	0.40 ¹⁰²
Breakwater ⁷⁶	WBK	105	Southern Pacific Co.	300, 600	P G	N	0.20	0.20 ¹⁰¹
Bridgeport (ex Breslau—see GERMANY)	—	—	—	—	—	—	—	—
Brilliant KTI ⁷⁶	KTI	200	Standard Transportation Co.	300, 450, 600	P G	X	0.20	0.20 ¹⁰¹
Brindilla ⁷⁶	KTZ	300	Standard Oil Co. (New Jersey)	300, 450, 600	P G	X	0.40	0.40 ¹⁰²
Brooklyn ¹²⁵	KNH	50	Colonial Nav. Co.	300, 600	P G	N	0.15	0.15

Brynildia ^{84 76}	..	..	KIO	—	Erythra Shipping Corporation...	300, 600	P G	..	—	0.20 101 0.40 102
Buccancer KFO ⁷⁶	..	..	KFO	150	Freeport and Tampico Fuel Oil and Transportation Corporation United States Steel Products Co.	300, 600	P G	..	X	0.20 101 0.40 102
Buenaventura ⁷⁶	..	..	KWA	200	Navy Army	300, 600	P G	..	X	0.20 101 0.40 102
Bufalo NCU ¹⁸⁸	..	..	NCU	—	Eastern S.S. Corporation..	300, 600	P G	..	N	0.20 101 0.40 102
Buford ^{180 116}	..	..	WXA	300	Army Navy	600	P G	..	N	0.20 101 0.40 102
Bulgaria (ex-German vessel— see GERMANY)	..	..	—	—	Eastern S.S. Corporation..	300, 450, 600	P G	..	N	0.20 101 0.40 102
Bunker Hill ⁷⁶	..	..	KJB	200	Army Navy Government	600	O ..	..	—	0.20 101 0.40 102
Burnside ^{123 139}	..	..	WXR	300	Navy Government	300, 600	P G	..	N	0.20 101 0.40 102
Burrows ¹²⁵	..	..	NZC	—	Navy	300, 600	P G	..	N	0.20 101 0.40 102
Bushnell ¹¹⁶	..	..	NZC	—	Navy	300, 600	P G	..	N	0.20 101 0.40 102
C. 1 ¹²⁶	..	..	NXL	—	Navy	300, 600	P G	..	N	0.20 101 0.40 102
C. 2 ¹²⁶	..	..	NXL	—	Navy	300, 600	P G	..	N	0.20 101 0.40 102
C. 3 ¹²⁶	..	..	NXM	—	Navy	300, 600	P G	..	N	0.20 101 0.40 102
C. 4 ¹²⁶	..	..	NXM	—	Navy	300, 600	P G	..	N	0.20 101 0.40 102
C. 5 ¹²⁶	..	..	NXO	—	Navy	300, 600	P G	..	N	0.20 101 0.40 102
Caballo ^{76 113}	..	..	WBV	150	Wilmington Transportation Co.	300, 500, 600	P G	..	X	0.05 0.20 101
C. A. Canfield ⁷⁶	..	..	WHI	300	Petroleum Transport Co.	300, 450, 600	P G	..	X	0.20 101 0.40 102
Cacique ¹³¹	..	..	WBE	—	W. R. Grace & Co. ..	300, 600, 1,800	P G	..	X	0.20 101 0.40 102
Caddo ⁷⁶	..	..	KSK	200	Standard Oil Co. (New Jersey) ..	300, 450, 600	P G	..	X	0.20 101 0.40 102
Caesar NCV ¹²³	..	..	NCY	—	Navy	300, 600	P G	..	—	0.20 101 0.40 102
Calamars ¹²³	..	..	KLC	500	Calamars S.S. Corporation (United Fruit Co.)	300, 600	P G	..	N	0.20 101 0.40 102
California KYO ⁴	..	..	KYO	200	Clara B. Stocker	300, 600	P G	..	N	0.20 101 0.40 102
California NDF ¹²³	..	..	NDF	—	Navy	300, 600	P G	..	X	0.20 101 0.40 102
California WOR ⁷⁶	..	..	WOR	150	Harby Steamship Co. (Inc.) ..	300, 600	P G	..	X	0.20 101 0.40 102
Californian WKC ⁸⁰	..	..	WKC	200	American Hawaiian S.S. Co. ..	300, 600	P G	..	X	0.20 101 0.40 102
Callao NOG ¹²⁵	..	..	NOG	—	Navy	300, 600	P G	..	N	0.20 101 0.40 102
Callao WHF ^{24 90}	..	..	WHF	150	George W. McNear (Inc.) ..	300, 600	P G	..	X	0.20 101 0.40 102
Caloria ⁷⁶	..	..	KSP	200	Standard Oil Co. (New Jersey) ..	300, 600	P G	..	X	0.20 101 0.40 102
Calvin Austin ⁷⁶	..	..	KRN	200	Eastern S.S. Corporation ..	300, 600	P G	..	N	0.20 101 0.40 102
Camaguey ⁷⁶	..	..	KWI	300	New York & Cuba Mail S.S. Co.	300, 450, 600	P G	..	N	0.20 101 0.40 102
Cambodge	..	..	KGR	—	New York and New Orleans S.S. Co.	300, 600	—	..	—	0.20 101 0.40 102
Camden ⁷⁶	..	..	KRC	200	Eastern S.S. Corporation ..	300, 600	P G	..	X	0.20 101 0.40 102
Camilla Rickmers (ex-German vessel—see GERMANY)	..	..	—	—	Standard Oil Co., California	—	—	..	—	0.20 101 0.40 102
Captain A. F. Lucas ⁷⁶	..	..	WTV	150	Standard Oil Co., California ..	300, 450, 600	P G	..	X	0.20 101 0.40 102

Chester W. Chapin ¹²⁵	50	KXQ	New England S.S. Co.	300, 550, 600	P G	0.20 131
Cheyenne NDH ¹²⁵	NDH	NDH	Navy	300, 600	P G	0.15
Chicago NDI ¹²⁵	—	NDI	Naval Militia	300, 600	P G	0.20 128
Chicago WAC ¹²⁵	100	WAC	Booth Fisheries Co.	300, 600	P G	0.20 121
China WWA ¹²⁵	150	WWA	China Mail Steamship Co.	300, 450, 600	P G	0.20
Choctaw ¹²⁵	—	NTV	Navy	300, 600	P G	0.40 102
Christopher Columbus ¹²⁵	150	WFJ	Goodrich Transit Co.	300, 600	P G	0.20
Cincinnati NDL ¹²⁵	—	NDL	Navy	300, 600	P G	0.10
City of Alpena II. ¹²⁵	125	WEH	Detroit & Cleveland Nav. Co.	300, 450, 500, 600	P G	0.20 124
City of Atlanta ¹²⁵	200	KFB	Ocean S.S. Co. (Savannah Line)	300, 450, 600	P G	0.10
City of Augusta ¹²⁵	300	KFJ	Ocean S.S. Co. (Savannah Line)	300, 450, 600	P G	0.20 101
City of Bangor ¹²⁵	200	KRH	Eastern S.S. Corporation	300, 600	P G	0.40 102
City of Benton Harbor ¹²⁵	150	WDV	Graham & Morton Transportation Co.	300, 600	P G	0.20 101
City of Brockton ¹²⁵	—	KXO	New England S.S. Co.	300, 600	P G	0.20
City of Buffalo ¹²⁵	100	WFO	Cleveland & Buffalo Transit Co.	300, 600	P G	—
City of Cleveland III. ¹²⁵	125	WEA	Detroit & Cleveland Nav. Co.	300, 600	P G	0.10
City of Columbus ¹²⁵	200	KFA	Ocean S.S. Co. (Savannah Line)	300, 450, 600	P G	0.10
City of Detroit II. ¹²⁵	125	WEC	Detroit & Cleveland Nav. Co.	300, 450, 500, 600	P G	0.40 102
City of Detroit III. ¹²⁵	125	WFF	Detroit & Cleveland Nav. Co.	300, 600	P G	0.10
City of Erie ¹²⁵	100	WFP	Cleveland & Buffalo Transit Co.	300, 600	P G	0.10
City of Everett ¹²⁵	250	KIQ	Standard Transportation Co.	300, 600	P G	0.20
City of Grand Rapids ¹²⁵	125	WDS	Graham & Morton Transportation Co.	300, 600	P G	9 a.m. to midday,
City of Lowell ¹²⁵	50	KXB	New England S.S. Co.	300, 550, 600	P G	2 p.m. to 5 p.m.,
City of Mackinac II. ¹²⁵	125	WEB	Detroit & Cleveland Nav. Co.	300, 450, 500, 600	P G	8 p.m. to 10.30 p.m.
City of Montgomery ¹²⁵	300	KFY	Ocean S.S. Co. (Savannah Line)	300, 450, 600	P G	0.10
City of Puebla ¹²⁵	200	WGQ	Harby S.S. Co. Inc.	300, 600	P G	0.20 101
City of Rockland ¹²⁵	200	KRI	Eastern S.S. Corporation	300, 600	P G	0.40 102
City of St. Ignace ¹²⁵	125	WEG	Detroit & Cleveland Nav. Co.	300, 450, 500, 600	P G	0.20 101
City of St. Joseph ¹²⁵	125	WDT	Graham & Morton Transportation Co.	300, 600	P G	0.40 102
City of St. Louis ¹²⁵	300	KFX	Ocean S.S. Co. (Savannah Line)	300, 450, 600	P G	0.10
City of Savannah ¹²⁵	200	KFK	Ocean S.S. Co. (Savannah Line)	300, 450, 600	P G	0.20 101
City of Seattle ¹²⁵	100	WGA	Pacific Coast Co.	300, 600	P G	0.40 102
City of South Haven ¹²⁵	150	WDI	Chicago & South Haven S.S. Co.	300, 600	P G	0.20 101
City of Taunton ¹²⁵	50	KXL	New England S.S. Co.	300, 550, 600	P G	0.40 102

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
UNITED STATES OF AMERICA—contd.								
City of Topeka ¹⁸	WGY	200	Pacific Coast Co.	300, 600	P G	N	Francs. 0.20 101 0.40 102	
City of Wilmington ¹⁸	WQC	150	Cape Fear Shipping & Trading Co.	300, 600	P G	X	0.20 101 0.40 102	
Cleveland NDM ¹⁸⁸	NDM	—	Navy	300, 600	P G	—	0.20 101 0.40 102	
Coalinga ¹⁸¹	WOT	150	Union S.S. Co.	300, 600, 1,800	P G	X	0.20 101 0.40 102	
Coamo ¹⁸	KGA	200	New York & Porto Rico S.S. Co.	300 450, 600	P G	N	0.20 101 0.40 102	
Col. E. L. Drake ¹⁸	WTS	150	Standard Oil Co., California	300 450, 600	P G	X	0.20 101 0.40 102	
Col. Geo. Armistead ^{118 188}	WYG	150	Army	600	O ..	X	—	
Col. P. S. Michie ¹⁸⁸	NZU	—	Army	200, 300, 425, 600	O ..	X	—	
Colon ¹⁸	KMX	250	Panama Railroad Co. ..	300 450, 600	P G	N	0.20 101 0.40 102	
Columbia NGA ¹⁸⁸	NGA	—	Navy	300, 600	P G	—	0.20 101 0.40 102	
Columbia WHC ¹⁸	WHC	150	Globe Grain & Milling Co.	300, 600	P G	N	0.20 101 0.40 102	
Columbine ¹⁸⁸	NLL	—	Department of Commerce (Bureau of Lighthouses)	600, 750, 1,000	O ..	X	—	
Colusa WIN ¹⁸	WIN	200	W. R. Grace & Co.	300, 800	P G	N	0.20 101 0.40 102	
Comal ¹⁸	KEM	200	Mallory S.S. Co.	300 450, 600	P G	N	0.20 101 0.40 102	
Comanche KVC ¹⁸	KVC	200	Clyde S.S. Co.	300, 600	P G	N	0.20 101 0.40 102	
Comanche NRW ¹⁸⁷	NRW	100	U.S. Revenue Cutter Service	300, 600	P G	N	0.20 101 0.40 102	
Comet KTJ ¹⁸	KTJ	200	Standard Transportation Co.	300 450, 600	P G	X	0.20 101 0.40 102	
Commodore ¹⁸	WFZ	75	Illinois Naval Battalion ..	300, 600, 820, 925, 1,020, 1,110, 1,200	P ..	X	—	
Commonwealth KXC ¹⁸⁸	KXC	50	New England S.S. Co. ..	1,260, 1,350	P G	N	0.15	
Communipaw ¹⁸	KOE	—	Standard Oil Co. (New Jersey)	300, 550, 600	—	—	0.20 101 0.40 102	
Comus KKD ¹⁸	KKD	200	Southern Pacific Co. ..	300, 600	P G	N	0.20 101 0.40 102	
Concho ¹⁸	KEC	300	Mallory S.S. Co.	300 450, 600	P G	N	0.20 101 0.40 102	
Concord KNC ¹⁸⁸	KNC	50	Colonial Nav. Co.	300 550, 600	P G	N	0.15	

Conyngham ¹²⁵	INJE	—	—	Navy	..	..	..	300, 600	P G	..	N	0.20
Coppename ¹¹⁹	KDF	500	500	Coppename .. S.S. Corporation (United Fruit Co.)	..	..	..	300, 600	P G	..	N	0.20
Cordova WAR ⁸⁰	WAR	100	100	Alaska S.S. Co.	..	..	..	300, 600	P G	..	X	0.20
Corning ⁷⁶	KIH	300	300	Standard Oil Co. (New Jersey)	..	..	..	300, 450, 600	P G	..	X	0.40 103
Corsair ^{4 76}	KYC	150	150	J. Pierpont Morgan estate	..	..	..	300, 600	P G	..	X	0.20 103
Costa Rica ⁸⁰	WQI	500	500	Bristol Bay Packing Co. ..	..	..	..	300, 600	P G	..	X	0.40 103
Covington (ex Cincinnati—see GERMANY)	—	—	—	United States Steel Products Co.	..	..	..	300, 600	P G	..	X	0.20 101
Craster Hall ⁷⁶	KLK	200	200	Southern Pacific Co.	..	..	..	300, 450, 600	P G	..	N	0.40 103
Creole ⁷⁶	KKR	300	300	Merchants & Miners Transportation Co.	..	..	..	300, 450, 600	P G	..	N	0.40 103
Cretan ⁷⁶	KQC	150	150	Panama Railroad Co.	..	..	..	300, 450, 600	P G	..	N	0.20 101
Cristobal ⁸⁰	KMD	300	300	United States Steel Products Co.	..	..	..	300, 450, 600	P G	..	N	0.40 103
Crofton Hall ⁷⁶	KML	200	200	Army .. ..	..	..	..	300, 600	P G	..	N	0.20 101
Crook ¹³⁷	WXB	Day, 200; night, 900	Day, 200; night, 900	Cuba Distilling Co.	..	..	..	300, 450, 600	P G	..	X	0.40 103
Cubadist ⁷⁶	KNV	300	300	Navy .. ..	..	..	..	300, 600	P G	..	N	0.20 101
Culgoa ¹²⁵	NDU	—	—	Navy .. ..	..	..	..	300, 600	P G	..	N	0.40 103
Cumberland NSZ ¹³⁸	NSZ	—	—	Navy .. ..	..	..	..	300, 600	P G	..	N	0.20 134
Cummings ¹²⁵	NIL	—	—	Navy .. ..	..	..	..	300, 600	P G	..	N	0.20 134
Curacao ⁷⁶	WGK	150	150	Pacific Coast Co. ..	..	..	..	300, 600	P G	..	N	0.20 101
Currier ⁷⁶	KNU	200	200	Gulf Refining Co. ..	..	..	..	300, 600	P G	..	X	0.40 103
Cushing NIM ¹²⁵	NIM	—	—	Navy .. ..	..	..	..	300, 600	P G	..	X	0.20 134
Cushing KSC ⁷⁶	KSC	300	300	Standard Oil Co. (New Jersey)	..	..	..	300, 450, 600	P G	..	X	0.20 101
Cuyama ¹³⁵	NOD	—	—	Navy .. ..	..	..	..	300, 600	P G	..	N	0.40 103
Cyclops NDY ¹³⁵	NDY	—	—	Department of Commerce (Bureau of Lighthouses)	..	..	..	600, 750, 1,000	P G	..	X	0.20 134
Cypress ¹³⁴	NLM	—	—	Neptune Line	..	..	..	300, 600	P G	..	X	—
Cyprus ⁸⁰	KVD	200	200	Army .. ..	..	..	..	300, 600	P G	..	X	—
Cyrus W. Field ¹³⁸	WXS	150	150	Navy .. ..	..	..	..	300, 600	P G	..	X	—
D. I. ¹³⁵	NXP	—	—	Navy .. ..	..	..	..	300, 600	P G	..	N	0.20
D. 2. ¹³⁵	D. 2.	—	—	Navy .. ..	..	..	..	300, 600	P G	..	N	0.20
D. 3. ¹³⁵	NXR	—	—	Navy .. ..	..	..	..	300, 600	P G	..	N	0.20
Dahlgren ¹³⁵	NVY	—	—	Navy .. ..	..	..	..	300, 600	P G	..	N	0.20
Dakotan ⁷⁶	WKD	200	200	American-Hawaiian S.S. Co.	..	..	..	300, 600	P G	..	X	0.20 101
Dale ¹³⁵	NIG	—	—	Navy .. ..	..	..	..	300, 600	P G	..	N	0.40 103
Davis ¹³⁵	NJF	—	—	Navy .. ..	..	..	..	300, 600	P G	..	N	0.20 101
Dawnlite ^{84 76}	KPP	—	—	Standard Oil Co. (New Jersey)	..	..	..	300, 600	P G	..	—	0.40 103
Daylite ^{84 76}	KPR	—	—	Standard Oil Co. (New Jersey)	..	..	..	300, 600	P G	..	—	0.40 103

Eastern States	Ship	Company	Port	Class	Speed	Days	Time	Remarks
Edgar F. Luckenbach	150	KGK	WIE	150	200	100	100	0.10
Edward L. Doherty	150	WIE	KGK	150	200	100	100	0.40
Edward Luckenbach	200	KGK	WIE	200	200	100	100	0.20
El Alba	200	KKL	WIE	200	200	100	100	0.40
Elcano	200	NFD	WIE	200	200	100	100	0.20
El Capitan	200	WNB	WIE	200	200	100	100	0.40
El Cid	200	KKY	WIE	200	200	100	100	0.20
El Dia	200	KKY	WIE	200	200	100	100	0.40
Elfrida	200	NEV	WIE	200	200	100	100	0.20
Ellington	40	NLN	WIE	40	200	100	100	0.40
El Mundo	200	KKU	WIE	200	200	100	100	0.20
El Norte	200	KKN	WIE	200	200	100	100	0.40
El Occidente	200	KKX	WIE	200	200	100	100	0.20
El Oriente	200	KKV	WIE	200	200	100	100	0.40
El Rio	200	KKZ	WIE	200	200	100	100	0.20
Elsass (ex-German vessel—see GERMANY)	—	—	—	—	—	—	—	0.40
El Segundo	150	WTQ	WIE	150	200	100	100	0.20
El Siglo	200	KKS	WIE	200	200	100	100	0.40
El Sol	200	KKB	WIE	200	200	100	100	0.20
El Sud	200	KKQ	WIE	200	200	100	100	0.40
El Valle	200	KKW	WIE	200	200	100	100	0.20
Enterprise	200	WMN	WIE	200	200	100	100	0.40
Eocene	300	KTM	WIE	300	200	100	100	0.20
Ericsson	150	NIS	WIE	150	200	100	100	0.40
E. R. Sterling	100	WIS	WIE	100	200	100	100	0.20
Esperanza	200	KWZ	WIE	200	200	100	100	0.40
Essex KQE	200	KQE	WIE	200	200	100	100	0.20
Essex NMY	—	NMY	WIE	—	200	100	100	0.40
Eslingen (ex-German vessel—see GERMANY)	—	—	—	—	—	—	—	0.20
Luckenbach Co. (Inc.)	300, 450, 530, 600	P G	..	..	..	..	..	0.10
Petroleum Transport Co.	300, 450, 600	P G	..	..	..	..	..	0.40
Luckenbach Co. (Inc.)	300, 450, 600	P G	..	..	..	..	..	0.20
Southern Pacific Co.	300, 450, 600	P G	..	..	..	..	..	0.40
Navy	300, 450, 600	P G	..	..	..	..	..	0.20
Standard Oil Co. (New Jersey)	300, 450, 600	P G	..	..	..	..	..	0.40
Southern Pacific Co.	300, 450, 600	P G	..	..	..	..	..	0.20
Southern Pacific Co.	300, 450, 600	P G	..	..	..	..	..	0.40
Navy	300, 450, 600	P G	..	..	..	..	..	0.20
U.S. Department of Labor (Immigration Service)	300, 450, 600	P G	..	..	..	..	..	0.40
Southern Pacific Co.	300, 450, 600	P G	..	..	..	..	..	0.20
Southern Pacific Co.	300, 450, 600	P G	..	..	..	..	..	0.40
Southern Pacific Co.	300, 450, 600	P G	..	..	..	..	..	0.20
Southern Pacific Co.	300, 450, 600	P G	..	..	..	..	..	0.40
Standard Oil Co., California	300, 450, 600	P G	..	..	..	..	..	0.20
Southern Pacific Co.	300, 450, 600	P G	..	..	..	..	..	0.40
Southern Pacific Co.	300, 450, 600	P G	..	..	..	..	..	0.20
Southern Pacific Co.	300, 450, 600	P G	..	..	..	..	..	0.40
Southern Pacific Co.	300, 450, 600	P G	..	..	..	..	..	0.20
Matson Nav. Co.	300, 450, 600	P G	..	..	..	..	..	0.40
Standard Transportation Co.	300, 450, 600	P G	..	..	..	..	..	0.20
Navy	300, 450, 600	P G	..	..	..	..	..	0.40
Sterling Shipping Co.	300, 450, 600	P G	..	..	..	..	..	0.20
New York & Cuba Mail S.S. Co.	300, 450, 600	P G	..	..	..	..	..	0.40
Merchants & Miners Transportation Co.	300, 450, 600	P G	..	..	..	..	..	0.20
Navy	300, 450, 600	P G	..	..	..	..	..	0.40

Ship Stations—Continued

Name	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
UNITED STATES OF AMERICA—cont'd.								
Eurana ⁷⁶ ..	K J G	200	The Nafta Co. Inc.	300, 450, 600	P G	X	Francs. 0.20 ¹⁰¹ 0.40 ¹⁰²	
Eureka ..	WAE	—	Alaska Steamship Co.	300, 600	—	—	—	
Evangeline KII ⁷⁶ ..	KII	200	J. W. Elwell & Co.	300, 600	P G	N	— ¹⁰¹ 0.20 ¹⁰² 0.40 ¹⁰³	
Excelsior KKO ⁷⁶ ..	KKO	300	Southern Pacific Co.	300, 450, 600	P G	N	0.20 ¹⁰¹ 0.40 ¹⁰²	
Expansion ^{80 81} ..	WOH	20	North Alaska Salmon Co.	300, 600	P G	X	—	
Explorer ^{100 114} ..	NLI	150	Government	300, 600	O	N	0.20 ¹¹⁴ 0.20 ¹¹⁴	
F. 2, ¹¹⁵ ..	NXV	—	Navy	300, 600	P G	—	0.20 ¹⁰¹ 0.20 ¹⁰¹	
F. 3, ¹¹⁵ ..	NXW	—	Navy	300, 600	P G	N	0.20 ¹⁰¹ 0.40 ¹⁰²	
F. A. Kilburn ⁷⁶ ..	WRW	150	North Pacific S. S. Co.	300, 600	P G	—	0.20 ¹¹⁴ 0.20 ¹¹⁴	
Fanning ¹¹⁵ ..	NFM	—	Navy	300, 600	P G	—	0.20 ¹⁰¹ 0.40 ¹⁰²	
Farragut ¹¹⁵ ..	NVS	—	Navy	300, 600	P G	X	0.10	
Favorite ^{76 115} ..	WCF	100	Great Lakes Towing Co.	300, 600	P G	—	0.10	
F. B. Squire ^{76 107} ..	WPU	—	Jenkins Steamship Co.	300, 600	P G	X	0.20	
Fearless WRP ^{80 114} ..	WRP ¹¹⁵	100	Ship Owners & Merchants Tug-boat Co.	300, 600	P G	X	0.20	
Finland ⁷⁶ ..	KSF	200	International Mercantile Marine Co. (Panama-Pacific Line)	300, 600	P G	N	0.20 ¹⁰¹ 0.40 ¹⁰²	
Finwood ⁸⁰ ..	WSB	100	Pacific-American Fisheries Inc.	300, 450, 525, 600	P G	N	0.20	
Fish Hawk ¹¹⁵ ..	NFV	—	Navy	300, 600	P G	N	0.20	
Florida KUS ⁷⁶ ..	KUS	150	The Texas Co.	300, 600	P G	X	0.20 ¹¹⁴ 0.20 ¹⁰¹	
Florida NFR ¹¹⁵ ..	NFR	—	Navy	300, 600	P G	X	0.40 ¹⁰³ 0.40 ¹⁰³	
Floridan ⁷⁶ ..	WLR	300	American Hawaiian S. S. Co.	300, 450, 600	P G	—	0.20 ¹¹⁴ 0.20 ¹⁰¹	
Flusser ¹¹⁵ ..	NFS	—	Navy	300, 600	P G	N	0.20 ¹⁰¹ 0.40 ¹⁰²	
Footie ¹¹⁵ ..	NWF	—	Navy	300, 600	P G	—	0.20 ¹⁰¹ 0.40 ¹⁰³	
Fortonian ⁷⁶ ..	KRU	—	A. W. Duckett & Co.	300, 600	P G	—	—	
Fort Bragg ⁸⁵ ..	WLB	—	Charles H. Higgins & Co.	300, 600	—	—	—	
Fortune NVL ¹¹⁵ ..	NVL	—	Navy	300, 600	P G	N	0.20	
Fox NWJ ¹¹⁵ ..	NWJ	—	Navy	300, 600	P G	N	0.20 ¹⁰¹ 0.40 ¹⁰³	
F. Q. Barstow ⁷⁶ ..	KNQ	—	Standard Oil Co. (New Jersey)	300, 600	P G	—	0.40 ¹⁰³ 0.40 ¹⁰³	
Frank H. Buck ¹¹¹ ..	WTO	150	Associated Oil Co.	300, 600, 1,800	P G	X	0.20 ¹⁰¹ 0.40 ¹⁰³	

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Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
UNITED STATES OF AMERICA—contd.								
Glenpool ^{76 81} ..	KOH	200	Standard Oil Co. (New Jersey) ..	300, 450, 600	P G	X	Frans.	Frans.
Gloucester KQG ⁷⁶ ..	KQG	200	Merchants & Miners Transportation Co.	300, 450, 600	P G	N	0.20 ¹⁰¹ 0.40 ¹⁰²	—
Gloucester NSL ..	NSL	—	Naval Militia ..	300, 600	P G	—	0.20 ¹⁰¹ 0.40 ¹⁰²	—
Goldborough ¹²⁵ ..	NGJ	250	Navy ..	300, 450, 600	P G	X	0.20 ¹⁰¹ 0.40 ¹⁰²	—
Gold Shell ⁷⁶ ..	WIB	—	Shell Co. of California ..	300, 450, 600	P G	—	0.20 ¹⁰¹ 0.40 ¹⁰²	—
Goliath ^{80 114} ..	WPG	100	Puget Sound Tug-Boat Co. ..	300, 600	P G	X	0.20	—
Gopher ¹²⁵ ..	NNY	—	Navy ..	300, 600	P G	N	0.20	—
Gouverneur Jaeschke (ex-German vessel—see GERMANY)	—	—	—	—	—	—	—	—
Governor ⁷⁶ ..	WGR	200	Pacific Coast Co. ..	300, 600	P G	N	0.20 ¹⁰¹ 0.40 ¹⁰²	—
Governor Cobb ⁷⁶ ..	KRB	200	Eastern S.S. Corporation ..	300, 600	P G	N	0.20 ¹⁰¹ 0.40 ¹⁰²	—
Governor Dingley ⁷⁶ ..	KRV	200	Eastern S.S. Corporation ..	300, 600	P G	N	0.20	—
Granite State ¹²⁵ ..	NNZ	—	Navy ..	300, 600	P G	N	0.20 ¹⁰¹ 0.40 ¹⁰²	—
Great Northern ⁷⁶ ..	WIR	150	Great Northern Pacific S.S. Co. ..	300, 450, 600	P G	N	0.20 ¹⁰¹ 0.40 ¹⁰²	—
Grecian ⁷⁶ ..	KQR	150	Merchants and Miners Transportation Co.	300, 450, 600	P G	N	0.20 ¹⁰¹ 0.40 ¹⁰²	—
Greenwood ..	WLL	—	Greenwood Steamship Co.	—	—	—	—	—
Gresham ¹²⁷ ..	NRG	300	U.S. Revenue Cutter Service ..	300, 600, 750	P G	N	0.20 ¹⁰¹ 0.40 ¹⁰²	—
Guantanamo ⁷⁶ ..	KWN	200	New York & Cuba Mail S.S. Co.	300, 600	P G	N	0.20 ¹⁰¹ 0.40 ¹⁰²	—
Guardian ^{80 122} ..	WGZ	200	Central & South American Telegraph Co.	300, 600	P G	X	0.20	—
Gulfoast ⁷⁶ ..	KUE	200	Gulf Refining Co. ..	300, 600	P G	X	0.20 ¹⁰¹ 0.40 ¹⁰²	—
Gulflight ⁷⁶ ..	KUA	200	Gulf Refining Co. ..	300, 600	P G	X	0.20	—
Gulfoid ⁷³ ..	KTG	200	Gulf Refining Co. ..	300, 600	P G	X	0.20 ¹⁰¹ 0.40 ¹⁰²	—
Gulfstream ⁷⁶ ..	KTB	250	Gulf Refining Co. ..	300, 600	P G	X	0.20 ¹⁰¹ 0.40 ¹⁰²	—
H.I. ¹³⁵ ..	NYC	—	Navy ..	300, 600	P G	—	0.20 ¹⁰¹ 0.40 ¹⁰²	—

Hancock ¹³⁵	NHI	—	Navy	..	..	300, 600	P G	..	—	0.40 102
Hannibal NGU ¹²⁵	NGU	—	Navy	..	..	300, 600	P G	..	—	0.20 124
Harry Luckenbach ⁷⁶	KGX	200	Edgar F. Luckenbach	..	..	300, 450, 600	P G	..	X	0.20 101
Harteale ^{118 80}	KEW	100	J. D. Hardin, jun..	..	..	300, 600	P G	..	X	0.40 102
Hartford ¹²⁵	NGV	—	Navy	..	..	300, 600	P G	..	N	0.20 101
Harvard ³¹	WRH	150	Pacific Navigation Co.	..	..	300, 600, 1,800	P G	..	N	0.20 101
Hattie Luckenbach ⁷⁶	WNF	200	Edgar F. Luckenbach	..	..	300, 600	P G	..	X	0.40 102
Havana ⁷⁶	KWH	300	New York & Cuba Mail S.S. Co.	..	..	300, 450, 600	P G	..	N	0.20 101
Hawaiian ⁸⁰	WKU	200	American Hawaiian S.S. Co.	..	..	300, 600	P G	..	X	0.20 101
Hawk ¹³⁵	NSM	—	Navy	..	..	300, 600	P G	..	—	0.40 102
H. C. Folger ⁷⁶	KHS	250	Atlantic Refining Co.	..	..	300, 450, 600	P G	..	N	0.20 101
Hector ¹³⁵	NGX	—	Navy	..	..	300, 600	P G	..	—	0.40 102
Helena ¹³⁵	NGY	—	Navy	..	..	300, 600	P G	..	—	0.20 124
Henley ¹³⁵	NHA	—	Navy	..	..	300, 600	P G	..	—	0.20 124
Henry J. Biddle ⁸⁰	WOW	250	Columbia Contract Co.	..	..	300, 600	P G	..	X	0.20 101
Henry M. Flagler ^{76 125}	KOX	100	Florida East Coast Railway Co.	..	..	300, 600	P G	..	X	0.20 101
Henry R. Mallory ⁷⁶	KEF	250	Mallory S.S. Co.	..	..	300, 450, 600	P G	..	N	0.40 102
Henry T. Scott	WRA	150	California S.S. Co.	..	..	300, 600	P G	..	X	0.40 102
Henry Wilson ^{114 125}	WZS	—	Army	..	..	1,200	O	..	X	0.40 102
Herbert G. Wylie ⁷⁶	WIF	200	Petroleum Transport Co.	..	..	300, 450, 600	P G	..	X	0.40 102
Hercules NTW ¹²⁵	NTW	—	Navy	..	..	300, 600	P G	..	N	0.40 102
Hercules WRP ^{80 114}	WRP ¹²⁵	100	Ship Owners & Merchants' Tug-boat Co	..	..	300, 600	P G	..	X	0.20 101
Heredia ¹¹³	KDH	500	Heredia Steamship Corporation (United Fruit Co.)	..	..	300, 600	P G	..	N	0.40 102
Herman Frasch ¹³⁵	KFH	250	Union Sulphur Co.	..	..	300, 600	P G	..	9 a.m. to midday, 2 p.m. to 5 p.m., 8 p.m. to 10.30 p.m.	0.40 102
Hermosa ^{76 125}	WBP	150	Wilmington Transportation Co.	..	..	300, 500, 600	P R ¹⁰³	..	9 a.m. to midday, 2 p.m. to 5 p.m., 7 p.m. to 9 p.m.	0.05 103
Hewitt ⁸⁶	KIL	250	Union Sulphur Co.	..	..	300, 600	P G	..	X	0.40 102
H. H. Rogers ⁷⁶	KSI	200	Standard Oil Co. (New Jersey)	..	..	300, 450, 600	P G	..	—	0.20 101
H. M. Flager ⁷⁶	KER	—	Standard Oil Co. (New Jersey)	..	..	—	P G	..	—	0.40 102
Holden Evans ^{76 91}	KMY	150	Continental Transportation & Oil Co.	..	..	300, 450, 600	P G	..	X	0.40 102
Holland WDW ⁷⁶	WDW	150	Graham & Morton Transportation Co.	..	..	300, 600	P G	..	X	0.40 102

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
UNITED STATES OF AMERICA—contd.								
Holsatia (ex-German vessel—see GERMANY)	—	—	—	—	—	—	—	—
Hopkins ¹³⁴	NHC	—	Navy	300, 600	P G	—	0.20	134
Houston (ex Liebenfels—see GERMANY)	—	—	—	—	—	—	—	—
Howard ⁷⁶	KQH	200	Merchants & Miners Transportation Co.	300, 450, 600	P G	N	0.20	101
Howick Hall ⁷⁶	KLT	200	United States Steel Products Co.	300, 600	P G	X	0.40	102
Hull ¹³⁵	NHE	—	Navy	300, 600	P G	—	0.20	134
Humboldt ⁷⁶	WHX	100	Humboldt S.S. Co.	300, 600	P G	N	0.20	101
Huntington ¹³⁵	NWG	—	Navy	300, 600	P G	N	0.40	102
Huntress ¹³⁵	NSN	—	Navy	300, 600	P G	N	0.20	—
Huron (ex Friedrich der Grosse—see GERMANY)	—	—	—	—	—	—	0.20	—
Huron KVH ⁷⁶	KVH	300	Clyde S.S. Co.	300, 450, 600	P G	N	0.20	101
Huron WCH ^{76 107}	WCH	—	Wyandotte Transportation Co.	300, 600	P G	—	0.40	102
Hyades ⁷⁶	WMK	200	Matson Nav. Co.	300, 450, 600	P G	X	0.10	—
Iaquia ⁷⁶	WLI	100	Philadelphia Shipping Co.	300, 600	P G	X	0.40	102
Idaho WOO ⁷⁶	WOO	—	Wilson Bros. & Co.	300, 450, 600	P G	N	0.40	102
Idaho NHN ¹²⁵	NHN	—	Navy	300, 600	P G	N	0.20	101
I. D. Fletcher ^{76 110}	KFI	200	Coast Transit Co.	300, 600	P G	X	0.20	101
Illinois NHO ¹³⁵	NHO	—	Navy	300, 600	P G	—	0.40	102
Illinois WCZ ⁷⁶	WCZ	150	Northern Michigan Transportation Co.	300, 600	P G	X	0.20	101
Inco No. 1 ^{76 110}	WQA	150	Inland Navigation Co.	300, 450, 600	P G	X	0.40	102
Indiana NHO ¹³⁵	NHO	—	Navy	300, 600	P G	X	0.20	101
Indiana WFC ^{105 76}	WFC	100	Goodrich Transit Co.	300, 600	P G	X	0.20	101
Intrepid NFY ¹²⁵	NFY	—	Navy	300, 600	P G	N	0.10	—
Iowa ¹³⁵	NHT	—	Navy	300, 600	P G	X	0.20	134
Iowan ⁸⁰	WKJ	250	American-Hawaiian S.S. Co.	300, 600	P G	X	0.20	101
Iris NHU ¹³⁵	NHU	—	Navy	300, 600	P G	—	0.40	102
Iris ¹³⁵	NHU	—	Navy	300, 600	P G	—	0.20	134

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Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
UNITED STATES OF AMERICA—contd.								
K. 6 ¹²⁵	NYK	—	Navy	300, 600	P G	—	Francs. 0.20 ¹⁸⁴	
K. 7 ¹²⁵	NYL	—	Navy	300, 600	P G	—	0.20 ¹²⁴	
K. 8 ¹²⁵	NVM	—	Navy	300, 600	P G	—	0.20 ¹²⁴	
Kanawha ¹²⁵	NND	—	Navy	300, 600	P G	N	0.20	
Kansas ⁹⁰	WKK	200	American-Hawaiian S.S. Co.	300, 600	P G	N	0.20 ¹⁰¹	
Kansas NIO ¹²⁵	NIO	—	Navy	300, 600	P G	—	0.40 ¹⁰³	
Karina KYR ⁴⁸⁰	KYR	—	Theodore P. Burgess	—	—	—	0.20 ¹²⁴	
Kearsarge ¹²⁵	NIP	—	Navy	300, 600	P G	N	0.20 ¹⁰¹	
Kentra ⁷⁶	KLN	200	United States Steel Products Co.	300, 600	P G	—	0.40 ¹⁰²	
Kentuckian ⁹⁰	WKE	200	American-Hawaiian S.S. Co.	300, 600	P G	X	0.40 ¹⁰³	
Kentucky NIQ ¹²⁵	NIQ	—	Navy	300, 600	P G	—	0.20 ¹²⁴	
Kershaw ⁷⁶	KQK	200	Merchants & Miners Transportation Co.	300, 450, 600	P G	N	0.20 ¹⁰¹	
Kilpatrick ^{120 120}	WXD	300	Army	600	P G	N	0.20 ¹⁰¹	
Klamath ⁷⁶	WSX	150	Klamath S.S. Co. (C. R. McCormick & Co.)	300, 600	P G	N	0.20 ¹⁰¹	
Koln (ex-German vessel—see GERMANV)	—	—	—	—	—	—	0.40 ¹⁰³	
Kroonland ⁷⁶	KSH	200	International Mercantile Marine Co. (Panama Pacific Line)	300, 600	P G	N	0.20 ¹⁰¹	
Kukui ^{115 126}	NLP	100	Government	300, 600	O	X	0.40 ¹⁰²	
Kvichak ⁹⁰	WNS	300	Alaska Packers' Association	300, 400, 500, 600	P G	N	0.20	
L. 1 ¹²⁵	NYN	—	Navy	300, 600	P G	N	0.20	
L. 2 ¹²⁵	NVO	—	Navy	300, 600	P G	N	0.20	
L. 3 ¹²⁵	NVP	—	Navy	300, 600	P G	N	0.20	
L. 4 ¹²⁵	NVO	—	Navy	300, 600	P G	N	0.20	
L. 5 ¹²⁵	NVQ	—	Navy	300, 600	P G	N	0.20	
L. 6 ¹²⁵	NVQ	—	Navy	300, 600	P G	N	0.20	
L. 7 ¹²⁵	NVW	—	Navy	300, 600	P G	N	0.20	
L. 8 ¹²⁵	NVW	—	Navy	300, 600	P G	N	0.20	
L. 9 ¹²⁵	NVW	—	Navy	300, 600	P G	N	0.20	
L. 10 ¹²⁵	NVX	—	Navy	300, 600	P G	N	0.20 ¹⁰¹	
L. 11 ¹²⁵	NVX	—	Navy	300, 600	P G	N	0.20 ¹⁰¹	
La Brea ¹³¹	WON	300	Union Oil Co. of California	300, 600, 1,800	P G	X	0.40 ¹⁰²	
Lackawanna KOP ⁷⁶	KOP	150	R. Lawrence Smith Inc.	300, 450, 600	P G	—	0.20 ¹⁰¹	
Lakeland ⁷⁶	WDL	125	Northwestern Steamship Co.	300, 600	P G	N	0.40 ¹⁰¹	
Lalor ⁷⁶	WDL	100	Northwestern Steamship Co.	300, 600	P G	X	0.10	

Lancaster NEW 128	NEW	—	Navy	Union S.S. Co.	..	..	300, 600	P G	..	N	0.20 101
Lansing 131	WTC	150	Union S.S. Co.	..	..	..	300, 600, 1,800	P G	..	X	0.20 102
Larimer 76	KTA	200	Gulf Refining Co.	..	..	..	300, 600	P G	..	X	0.20 103
Latonche 80	WAI	100	Alaska S.S. Co.	..	..	..	300, 600	P G	..	X	0.40 102
Lawrence 128	NIV	—	Navy	..	..	..	300, 600	P G	..	X	0.20
Lebanon 128	NIZ	—	Navy	..	..	..	300, 600	P G	..	X	0.20 134
Lenape 76	KVL	200	Clyde S.S. Co.	..	..	..	300, 450, 600	P G	..	N	0.20 134
Leonidas NNH 128	NNH	—	Navy	..	..	..	300, 600	P G	..	—	0.40 102
Leviathan (ex Vaterland—see GERMANY)	—	—	—	—	..	..	—	—	..	—	0.20 134
Lewis Luckenbach 76	WNH	—	Edgar F. Luckenbach	..	..	..	—	—	..	—	0.20
Lexington 110 128	KNB	50	Colonial Nav. Co.	..	..	..	300, 550, 600	P G	..	N	0.15
Lieut. Geo. M. Harris 114 129	WYR	30	Army	..	..	..	300, 600	O	..	X	0.20
Ligonier 76	KTD	200	Gulf Refining Co.	..	..	..	300, 600	P G	..	X	0.20
Liscum 129 130	WXE	300	Army	..	..	..	600	P G	..	N	0.20
Logan 129 130	WXF	300	Army	..	..	..	600	P G	..	N	0.20
Loongmoon (ex-German vessel—see GERMANY)	—	—	—	—	..	..	—	—	..	—	—
Los Angeles 121	WOL	200	Union Oil Co. of California	..	..	..	300, 600, 1,800	P G	..	X	0.20 101
Louisiana KUL 76	KUL	300	The Texas Co.	..	..	..	300, 450, 600	P G	..	X	0.40 102
Louisiana NJB 128	NJB	—	Navy	..	..	..	300, 600	P G	..	—	0.20 101
L. Roscoe	NZX	150	Alaska Engineering Commission..	..	..	..	300, 600, 750	O	..	—	0.20 134
Luckenbach No. 1 113 114	KEO	—	Edgar F. Luckenbach	..	..	..	—	—	..	—	—
Luckenbach No. 2 113	KGF	—	Edgar F. Luckenbach	..	..	..	—	—	..	—	—
Luckenbach No. 3 80 114	KGF	150	Edgar F. Luckenbach	..	..	..	300, 450, 600	P G	..	X	0.20
Luckenbach No. 4 80 114	KGG	—	Edgar F. Luckenbach	..	..	..	—	—	..	—	—
Luckenbach No. 5 80 114	KEV	150	Luckenbach Co. (Inc.)	..	..	..	300, 450, 800	P G	..	X	0.20 101
Lurline 76	WML	150	Matson Nav. Co.	..	..	..	300, 450, 600	P G	..	X	0.40 102
Lydonia 76	WDY	150	W. A. Lydon	..	..	..	300, 600	P G	..	X	0.10
Lyman Stewart 121	WTL	150	Union Oil Co. of California	..	..	..	300, 600, 1,800	P G	..	X	0.20 101
Lysistrata 80	KYL	—	James Gordon Bennett	..	..	..	300, 600	P G	..	X	0.40 102
M. I. 125	NYV	—	Navy	..	..	..	300, 600	P G	..	N	0.20 134
Macdonagh 128	NJH	—	Navy	..	..	..	300, 600	P G	..	—	0.20 134
Machias 125	WHW	500	Naval Militia	..	..	..	300, 600	P G	..	X	0.20 101
Mackinaw 80	—	—	George and James Flood	..	..	..	300, 600	P G	..	—	0.40 102
Macona 76	KFC	300	Barber & Co. (Inc.)	..	..	..	300, 600	P G	..	N	0.20 101
Madawaska (ex König Wilhelm II—see GERMANY)	—	—	—	—	..	..	—	—	..	—	0.40 102
Madison 76	KOG	300	Old Dominion S.S. Co.	..	..	..	300, 450, 600	P G	..	N	0.15
Maine KXD 129	KXD	50	New England S.S. Co.	..	..	..	300, 550, 600	P G	..	N	—

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
UNITED STATES OF AMERICA—contd.								
Maine NJL ¹¹⁵	NJL	—	Navy	300, 600	P G	—	Francs. 0.20 ¹¹⁴	Francs. —
Mainland No. 1 ¹¹⁶ 115 ¹¹⁶	WLE	100	Toronto, Hamilton & Buffalo Rly. Co.	300, 600	P G	X	0.10	—
Major Albert G. Forse ¹¹⁴ 115 ¹¹⁶	WYQ	—	Army	1,200	O	X	—	—
Major Ryan Thomas ¹¹⁴ 115 ¹¹⁶	WYO	35	Army	300	O	X	—	—
Major Guy Howard ¹¹⁵	WZY	30	Army	400	O	X	—	—
Major Samuel Ringgold ¹¹⁵ 115 ¹¹⁶	WYC	35	Army	300	O	X	—	—
Manchuria ¹¹⁶	WWE	250	Atlantic Transport Co. of West Virginia	300, 600	P G	N	0.20 ¹⁰¹	0.20 ¹⁰¹
Manitou WFW ¹¹⁶	WFW	150	Northern Michigan Transportation Co.	300, 600	P G	N	0.40 ¹⁰²	0.40 ¹⁰²
Manning ¹¹⁷	NRN	150	U.S. Revenue Cutter Service	300, 600	P G	N	0.20	0.20
Manoa ¹¹⁶	WMQ	200	Matson Nav. Co.	300, 450, 600	P G	N	0.20 ¹⁰¹	0.20 ¹⁰¹
Maracaibo ¹¹⁶	KDM	300	Atlantic & Caribbean Steam Nav. Co.	300, 450, 600	P G	N	0.20 ¹⁰¹	0.40 ¹⁰²
Marblehead	NGK	—	Naval Militia	300, 600	—	—	0.20	—
Margaret WRQ ⁸⁰	WRQ	100	McEachern Ship Co.	300, 450, 525, 600	P G	N	0.20	—
Marietta ¹¹⁵	NJO	—	Naval Militia	300, 600	P G	N	0.20 ¹¹⁴	0.20 ¹¹⁴
Marina ¹¹⁶	KXU	—	Bull Insular Steamship Co.	300, 450, 600	P G	N	0.20 ¹⁰¹	0.40 ¹⁰²
Mariposa ⁸⁰	WHP	200	Alaska S.S. Co.	300, 455, 525, 600	P G	X	0.20	—
Mark (ex-German vessel—see GERMANY)	—	—	—	—	—	—	—	—
Marquette & Bessemer No. 1 ⁸⁰	WEW	125	Marquette & Bessemer Dock & Nav. Co.	300, 425, 540, 600	PR ¹⁰⁶	X	0.10	—
Marquette & Bessemer No. 2 ⁸⁰	WEX	125	Marquette & Bessemer Dock & Nav. Co.	300, 425, 540, 600	PR ¹⁰⁶	X	0.10	—
Marx NJR ¹¹⁵	NJR	—	Navy	300, 600	P G	—	0.20 ¹¹⁴	0.20 ¹¹⁴
Martha Washington (ex Austrian vessel—see AUSTRIA)	—	—	—	—	—	—	—	—
Mary ⁸⁰	WRM	100	McEachern Ship Co.	300, 450, 525, 600	P G	N	0.20	0.20 ¹⁰¹
Mascotte ¹¹⁶	KOW	150	Peninsular & Occidental S.S. Co.	300, 600	P G	N	0.40 ¹⁰²	0.40 ¹⁰²

Ship	Company	Class	Capacity	Speed	Time	Remarks
Matsonia 74	Matson Nav. Co.	WMP	150	15.0	..	..
Maui 74	Matson Nav. Co.	WMR	—	—	..	..
Maunee 125	Navy	NNE	—	—	..	..
KZI	J. R. De Lamar	WRR	100	10.0	..	..
May WRR 80	A. O. Andersen & Co.	WRR	100	10.0	..	..
Mayflower 4 125	Navy	NJV	—	—	..	..
Mayrant 125	Navy	NJU	—	—	..	..
McCall 115	Navy	NJW	—	—	..	..
McClennan 129 130	Army	WXH	300	30.0	..	..
McCulloch 127	U. S. Revenue Cutter Service	NRH	150	15.0	..	..
McDougal 126	Navy	NIT	300	30.0	..	..
Meade 129 130	Army	WNG	300	30.0	..	..
Medina KEI 76	Mallory S. S. Co.	KEI	300	30.0	..	..
Melville 125	Government	NKA	—	—	..	..
Mercury (ex Barbarossa—see GERMANY)	—	—	—	—	..	..
Merrinack 76	Merchants & Miners Transportation Co.	KQM	200	20.0	..	..
Merritt 129 130	Army	WXI	300	30.0	..	..
Metapan 112	Metapan S. S. Corporation (United Fruit Co.)	KLF	500	50.0	..	..
Mexican 80	American Hawaiian S. S. Co.	WKL	350	35.0	..	..
Mexicano KGM 76	Pierce Navigation Co.	KGM	200	20.0	..	..
Mexico KWX 76	New York & Cuba Mail S. S. Co.	KWX	200	20.0	..	..
Miami KOZ 76	Peninsular & Occidental S. S. Co.	KOZ	150	15.0	..	..
Michigan NJZ 125	Navy	NJZ	—	—	..	..
Mielero 76	Cuba Distilling Co.	KNT	—	—	..	..
Millinocket 76	A. H. Bull S. S. Co.	KNM	200	20.0	..	..
Milwaukee NFB 125	Navy	NFB	—	—	..	..
Minneapolis NGB 125	Navy	NGB	—	—	..	..
Minnesota NKD 125	Navy	NKD	—	—	..	..
Minnesota WEK 76	Northern Michigan Transportation Co.	WEK	150	15.0	..	..
Minnesota WMI 76	Atlantic Transport Co. of West Virginia	WMI	150	15.0	..	..
Minnesotan 76	American Hawaiian S. S. Co.	WKM	200	20.0	..	..
Mississippi 125	Navy	NKE	—	—	..	..
Missouri NKF 125	Navy	NKF	—	—	..	..

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Meters (the Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
UNITED STATES OF AMERICA—contd.								Francs.
Missouri WFX ⁷⁶ ..	WFX	125	Northern Michigan Transportation Co.	300, 800	P G	N	0.10	—
Modoc ¹³⁵ ..	NUD	—	Navy	300, 800	P G	N	0.20	—
Mohave ¹³⁵ ..	NTO	—	Navy	300, 800	P G	N	0.20	—
Mohawk KXE ¹³⁵ ..	KXE	50	New England S.S. Co.	300, 550, 800	P G	N	0.15	—
Mohawk KVM ⁷⁶ ..	KVM	200	Clyde S.S. Co.	300, 450, 800	P G	N	0.20 101	—
Mohawk KYU ^{4 80} ..	KYU	10	Ralph E. Barry	300	P	X	0.40 103	—
Mohawk NRM ¹²⁷ ..	NRM	150	U.S. Revenue Cutter Service	300, 800	P G	N	0.20	—
Mohawk NUE ¹³⁵ ..	NUE	—	Navy	300, 800	P G	N	0.20	—
Mohegan NZA ¹³⁵ ..	NZA	—	Navy	300, 800	P G	N	0.20	—
Mohegan KXM ^{110 118} ..	KXM	50	New England S.S. Co.	300, 550, 800	P G	N	0.15	—
Momus ⁷⁶ ..	KKM	300	Southern Pacific Co.	300, 450, 800	P G	N	0.20 101	—
Monadnock ¹³⁵ ..	NHD	—	Navy	300, 800	P G	—	0.40 103	—
Monaghan ¹⁴⁵ ..	NKL	—	Navy	300, 800	P G	—	0.20 134	—
Mongolia WVN	WVN	250	Atlantic Transport Co. of West Virginia	300, 800	P G	N	0.20 101	—
Monocacy ¹³⁵ ..	NOQ	—	Navy	300, 800	P G	—	0.40 102	—
Montana ¹³⁵ ..	NKM	—	Navy	300, 800	P G	—	0.20 134	—
Montanan ⁸⁰ ..	WKN	200	American-Hawaiian S.S. Co.	300, 800	P G	X	0.20 101	—
Monterey KQY ⁷⁶ ..	KQY	200	New York & Cuba Mail S.S. Co.	300, 450, 800	P G	N	0.40 101	—
Monterey NKN ¹³⁵ ..	NKN	—	Navy	300, 800	P G	—	0.40 103	—
Montgomery ¹³⁵ ..	NKO	—	Navy	300, 800	P G	—	0.20 134	—
Moonlite ^{54 76} ..	KPL	100	Standard Oil Co. (New Jersey)	300, 450, 800	P G	X	0.20 101	—
Morrill ¹²⁷ ..	NRC	75	U.S. Revenue Cutter Service	300, 800	P G	N	0.40 102	—
Morris NWS ¹³⁵ ..	NWS	—	Navy	300, 800	P G	N	0.20	—
Morro Castle ⁷⁶ ..	KWC	300	New York & Cuba Mail S.S. Co.	300, 450, 800	P G	N	0.20	—
Mount Hope ⁸⁰ ..	KOL	—	Providence, Fall River & Newport Steamboat Co.	300	P G ¹⁰⁴	X	0.20 101	—
Mount Vernon (ex Kronprinzessin Cecilie—see Germany)	—	—	—	—	—	—	—	—
Multnomah ⁷⁶ ..	WMA	100	—	—	—	N	0.40 103	—

Munamar ¹²⁵ Mundae ¹²⁵
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Ship Stations—Continued

Name.	Call. Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type.)	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
UNITED STATES OF AMERICA—contd.								Francs.
Niagara KYN ^{4 80}	KYN	200	Howard Gould	300, 600	P G	X		—
Nicholson ¹³⁵	NIU	—	Navy	300, 600	P G	—		0.20 101 0.40 102
Nokomis WCHW ^{4 76}	WCHW	100	Horace E. Dodge	300, 600	P G	X		0.20 134 0.10
Nokomis WHD ^{4 76}	WHD	—	Horace E. Dodge	300, 600	P G	—		0.20 101 0.20 401
Noma ^{4 76}	KYO	200	Vincent Astor	300, 600	P G	X		0.40 102 0.20 801
Nordina ⁷⁶	KJE	150	Garland Steamship Corporation	300, 600	P G	X		0.40 103 0.40 102
Norman Bridge ⁷⁶	WIG	200	Petroleum Transport Co.	300, 600	P G	X		0.20 101 0.40 102
North American ⁷⁶	WEN	150	Chicago, Duluth & Georgian Bay Transit Co.	300, 600	P G	N		0.40 103 0.10
North Carolina ¹³⁵	NMN	—	Navy	300, 600	P G	—		0.20 134 0.20 134
North Dakota ¹³⁵	NMO	—	Navy	300, 600	P G	—		0.20 101 0.20 101
Northern Pacific ⁷⁶	WIM	150	Great Northern Pacific S.S. Co.	300, 405, 600	P G	N		0.40 103 0.40 102
North Land KJD ⁷⁶	KJD	200	Eastern S.S. Corporation	300, 600	P G	N		0.20 101 0.40 102
North Land WCN ⁷⁶	WCN	150	Northern S.S. Co.	300, 600	P G	N		0.10
North Star ⁷⁶	KJS	200	Eastern S.S. Corporation	300, 600	P G	N		0.20 101 0.40 102
Northwestern KUO ⁷⁶	KUO	200	The Texas Co.	300, 600	P G	X		0.20
Northwestern WAN ⁸⁰	WAN	100	Alaska S.S. Co.	300, 600	P G	X		0.20
North Wind ^{4 80}	KYB	75	Chas. M. Clark	300	P	X		—
Norwood ⁸⁰	WSG	250	Pacific-American Fisheries Inc.	300, 450, 525, 600	P G	X		0.20
Nueces ⁷⁶	KEH	200	Mallory S.S. Co.	300, 600	P G	X		0.20 101 0.40 102
Nushagak ⁸⁰	WNE	300	Alaska Packers' Association	300, 400, 500 1000	P G	N		0.20
O. B. Jennings ⁷⁶	KEN	—	Standard Oil Co. (New Jersey)	—	P G	—		0.20 101 0.40 102
O'Brien NIV ¹³⁵	NIV	—	Navy	300, 600	P G	—		0.20 134 0.20 134
Ockenfels (ex-German vessel— see GERMANY)	WCH	—	—	—	P G	N		0.10

Oklahoma 135	..	NCB	—	Navy	..	300, 800	P G	..	N	0.20
Oleum 131	..	WTD	150	Union Oil Co. of California	..	300, 600, 1,800	P G	..	X	0.20 101
Olivette 76	..	KOV	200	Peninsular & Occidental S.S. Co.	..	300, 450, 600	P G	..	N	0.40 103
Olympia NGG 128	..	NGG	—	Navy	..	300, 800	P G	..	N	0.20 101
Omega 76	..	KGU	200	Barber & Co. (Inc.)	..	300, 600	P G	..	X	0.20 103
Oncida KYP 400	..	KYP	250	E. C. Benedict	..	300, 550, 600	P G	..	X	0.20 101
Oncida NSO 125	..	NSO	100	Navy	..	300, 600	P G	..	X	0.40 103
Onconta 90 114	..	WFX	100	Port of Portland	..	300, 450, 525, 600	P G	..	N	0.20 101
Onondaga 137	..	NRO	300	U.S. Revenue Cutter Service	..	300, 800, 750	P G	..	N	0.20 103
Ontario NTA 135	..	NTA	—	Navy	..	300, 800	P G	..	N	0.40 103
Ontario KQO 76	..	KQO	150	Merchants & Miners Transportation Co.	..	300, 450, 600	P G	..	N	0.20 101
Oregon NMZ 155	..	NMZ	—	Navy	..	300, 800	P G	..	N	0.40 103
Oregon WOC 76	..	WOC	300	Wilson Bros. & Co.	..	300, 450, 600	P G	..	N	0.20 101
Oregon WOU 76	..	WOU	—	Crowley Launch & Tugboat Co.	..	—	—	..	—	0.40 103
Oregonian 80	..	WKO	200	American-Hawaiian S.S. Co.	..	300, 800	P G	..	X	0.20 101
Orion NOC 135	..	NOC	—	Navy	..	300, 800	P G	..	—	0.40 103
Oscrota 125	..	NOA	—	Navy	..	300, 800	P G	..	—	0.20 101
Ossipee 137	..	NRJ	300	Government	..	300, 600, 750, 1,000	P G	..	—	0.40 103
O. T. Waring 76	..	KJW	—	Standard Oil Co. (New Jersey)	..	—	P G	..	—	0.20 101
Ozark 135	..	NHH	—	Navy	..	300, 800	P G	..	—	0.40 103
Paducah 135	..	NOG	—	Navy	..	300, 800	P G	..	—	0.20 101
Palos 135	..	NOS	—	Navy	..	300, 800	P G	..	—	0.20 103
Panlico 137	..	NRN	50	U.S. Revenue Cutter Service	..	300, 800	P G	..	N	0.20 101
Pampanga 125	..	NOT	—	Navy	..	300, 800	P G	..	N	0.20 103
Panama KMH 80	..	KMH	300	Panama Railroad Co.	..	300, 450, 600	P G	..	N	0.20 101
Panama 80	..	WKR	300	American-Hawaiian S.S. Co.	..	300, 600	P G	..	X	0.20 103
Pan-American 76	..	KUT	150	The Texas Co.	..	300, 450, 600	P G	..	X	0.40 103
Panther NOJ 135	..	NOJ	—	Navy	..	300, 800	P G	..	—	0.20 101
Panuco KMM 76	..	KMM	200	Freeport & Tampico Fuel Oil and Transportation Corporation	..	300, 600	P G	..	X	0.40 103
Panuco KWM 76	..	KWM	250	New York & Cuba Mail S.S. Co.	..	300, 450, 600	P G	..	X	0.20 101
Paraguay 76	..	KTT	150	Sun Co.	..	300, 600	P G	..	X	0.40 103
Paraiso 76	..	WRI	200	Craig Shipbuilding Co.	..	300, 600	P G	..	N	0.20 101
Parismina 115	..	KDG	500	Parismina S.S. Corporation (United Fruit Co.)	..	300, 600	P G	..	N	0.40 103

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
UNITED STATES OF AMERICA—contd.								
Parker 139	NIX	—	Navy	300, 800	P G	—	Francs.	Francs.
Pastores 118	KLA	500	Pastores S.S. Corporation (United Fruit Co.)	300, 800	P G	N	0.30 118	—
				300, 800			0.40	—
Patapasco 135	NOL	—	Navy	600	P R 13	—	0.20 134	—
Pathfinder 109 116	NLJ	150	Navy	300, 800	O ..	N	—	—
Patterson NLH 109 116	NLH	150	Navy	300, 800	O ..	N	—	—
Patterson NOK 135	NOK	—	Navy	300, 800	P G	N	0.20 134	—
Patrol WIP 80	WIP	5	City of Seattle (Harbor Dept.)	300, 325	P ..	X	—	—
Patuxent 135	NOM	—	Navy	300, 800	P G	—	0.20 134	—
Paulding 135	KVN	—	Navy	300, 800	P G	—	0.20 134	—
Paul Jones KVJ 99 116	KVU	—	James W. Elwell & Co.	300, 800	P G	—	0.20	—
Paul Jones NOP 135	NOP	—	Navy	300, 800	P G	—	0.20 101	—
Paulsboro 75	KRS	—	Vacuum Oil Co.	300, 450, 600	P G	X	0.20 101	—
							0.40 103	—
Pawnee NUH 135	NUH	—	Navy	300, 800	P G	N	0.20	—
Pawtucket 135	NUJ	—	Navy	300, 800	P G	N	0.20	—
Pearl Shell 75	WIC	250	Shell Co. of California	300, 450, 600	P G	X	0.20 101	—
							0.40 103	—
Penacook 135	NUK	—	Navy	300, 800	P G	N	0.20	—
Pennant 75 88	KME	200	Pierce Oil Corporation	300, 450, 600	P G	X	0.20 101	—
							0.40 103	—
Pennsylvania (ex-German vessel—see GERMANY)	—	—	—	—	—	—	—	—
Pennsylvania NCE 135	NCE	—	Navy	300, 800	P G	N	0.20 101	—
Pennsylvania 89	WKP	200	American-Hawaiian S.S. Co.	300, 800	P G	X	0.40 103	—
							—	—
Pensacola (ex-Nicaragua—see GERMANY)	—	—	—	—	—	—	—	—
Pentucket 115	NUL	—	Navy	300, 800	P G	N	0.20	—
Peoria 135	NOW	—	Navy	300, 800	P G	—	0.20 134	—
Pequannock 115	KXP	50	New England S.S. Co.	300, 550, 800	P ..	X	0.15	—
Pere Marquette 17 135 76	WDA	100	Pere Marquette Railroad Co.	300, 500, 600	P ..	X	—	—
Pere Marquette 17 135 76	WDC	100	Pere Marquette Railroad Co.	300, 500, 600	P ..	X	—	—
Pere Marquette 17 135 76	WDD	125	Pere Marquette Railroad Co.	300, 500, 600	P ..	X	—	—
Pere Marquette 10 135 76	WDE	125	Pere Marquette Railroad Co.	300, 500, 600	P ..	X	0.10	—
Pere Marquette 20 135 76	WDB	125	Pere Marquette Railroad Co.	300, 500, 600	P ..	X	0.10	—
Perfection 75	KLN	200	Standard Transportation Co.	300, 450, 600	P G	X	0.20 101	—
							0.20 103	—

Ship	WHD	100	Company	300, 600	PG	..	X	0.40 101
Petostkey 10 107	NOZ	—	Chicago & South Haven S.S. Co.	300, 600	PG	..	X	0.10
Petrol 118	KDA	300	Navy	300, 600	PG	..	N	0.20 134
Philadelphia KDA 10	—	—	Atlantic & Caribbean Steam Nav. Co.	300, 450, 600	PG	..	N	0.20 101
Philadelphia KSM 10	KSM	200	American Line	300, 600	PG	..	N	0.40 103
Pioneer KIG 10	KIG	200	Standard Oil Co. (New Jersey)	300, 600	PG	..	X	0.20 101
Pioneer WPN 10 116	WPN	100	Puget Sound Tug-Boat Co.	300, 600	PG	..	X	0.20 102
Pisa (ex-German vessel—see GERMANY)	—	—	—	—	—	—	—	0.20
Pittsburgh 114	NOT	—	Navy	300, 600	PG	..	X	0.20 134
Pleides 10	WNP	200	Edgar F. Luckenbach	300, 600	PG	..	X	0.20 101
Plymouth 110 108	KXH	50	New England S.S. Co.	300, 550, 600	PG	..	N	0.40 102
Pocahontas (ex Princess Irene—see GERMANY)	—	—	—	—	—	—	—	0.15
Pocahontas 114	NOU	—	Navy	300, 600	PG	..	N	0.20 101
Polarine 10	KOI	200	Standard Oil Co. (New Jersey)	300, 450, 600	PG	..	X	0.40 103
Pompey 110	NOF	—	Navy	300, 600	PG	..	X	0.20 134
Ponce 10	KGP	200	New York & Porto Rico S.S. Co.	300, 450, 600	PG	..	X	0.20 101
Porter 113	NOO	—	Navy	300, 600	PG	..	N	0.40 103
Portland WLK 10 11	WLK	150	Alaska Pacific Nav. Co.	300, 450, 600	PG	..	X	0.20 101
Portland WNV 10	WNV	300	Nymo Line (Inc.)	300, 600	PG	..	X	0.40 101
Potomac NQK 110	NQK	—	Navy	300, 600	PG	..	—	0.20 134
Powhatan (ex Hamburg—see GERMANY)	—	—	—	—	—	—	—	—
Powhatan NUP 110	NUP	—	Navy	300, 600	PG	..	N	0.20
Prairie 113	NQM	—	Navy	300, 600	PR 13	..	—	0.20 134
President (ex-German vessel—see GERMANY)	—	—	—	—	—	—	—	—
Freble 110	NQN	—	Navy	300, 600	PG	..	N	0.20 134
President 10	WGP	150	Pacific Coast Co.	300, 600	PG	..	N	0.20 101
President Grant (ex-German vessel—see GERMANY)	—	—	—	—	—	—	—	0.40 102
President Lincoln (ex-German vessel—see GERMANY)	—	—	—	—	—	—	—	—
Preston NQO 110	NQO	—	Navy	300, 600	PG	..	—	0.20 134
Princess Alice (ex-German vessel—see GERMANY)	—	—	—	—	—	—	—	—
Princess Anne 10	KOB	200	Old Dominion S.S. Co.	300, 450, 600	PG	..	N	0.20 101
Princeton NQP 110	NQP	—	Navy	300, 600	PG	..	N	0.40 102
Princeton KST 10	KST	200	Standard Oil Co. (New Jersey)	300, 450, 600	PG	..	X	0.20 134
Prinz Joachim (ex-German vessel—see GERMANY)	—	—	—	—	—	—	—	0.20 101

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
UNITED STATES OF AMERICA—contd.								
Prinz Oskar (ex-German vessel—see GERMANY)	—	—	—	—	—	—	Francs.	Francs.
Priscilla ¹³⁵	KXI	50	New England S.S. Co.	300, 450, 600	P G	N	0.15	0.15
Prometheus ¹³⁵	NQR	—	Navy	300, 600	P G	—	0.20 ¹³⁴	0.20 ¹³⁴
Proteus KKP ⁷⁶	KKP	300	Southern Pacific Co.	300, 450, 600	P G	N	0.20 ¹⁰¹	0.20 ¹⁰¹
Proteus NNG ¹³⁵	NNG	—	Navy	300, 600	P G	—	0.40 ¹⁰²	0.40 ¹⁰²
Providence ^{110 128}	KXJ	50	New England S.S. Co.	300, 450, 600	P G	N	0.15	0.15
Providence ⁴⁰	WLK	200	Providencia S.S. Co. (S. E. Slade)	300, 600	P G	X	0.20 ¹⁰¹	0.20 ¹⁰¹
Pueblo ¹³⁵	NDN	—	Navy	300, 600	P G	N	0.40 ¹⁰²	0.40 ¹⁰²
Puritan ⁷⁶	WDU	100	Graham & Morton Transportation Co.	300, 600	P G	X	0.20	0.20
Quantico ⁷⁶	KQZ	200	Merchants & Miners Transportation Co.	300, 450, 600	P G	N	0.10	0.10
Queen WGX ⁷⁶	WGX	150	Pacific Coast Co.	300, 600	P G	X	0.20 ¹⁰¹	0.20 ¹⁰¹
Quiros ¹³⁵	NQZ	—	Navy	300, 600	P G	N	0.40 ¹⁰²	0.40 ¹⁰²
Radiant ⁷⁶	KTR	200	Standard Transportation Co.	300, 450, 600	P G	X	0.20	0.20
Rainbow NTD ¹³⁵	NTD	—	Navy	300, 600	P G	—	0.20 ¹⁰¹	0.20 ¹⁰¹
Raleigh ¹²⁶	NTE	—	Navy	300, 600	P G	—	0.40 ¹⁰²	0.40 ¹⁰²
Ranger NFU ¹³⁵	NFU	—	Navy	300, 600	P G	—	0.20 ¹³¹	0.20 ¹³¹
Ransom B. Fuller ⁷⁶	KRF	200	Eastern S.S. Corporation	300, 600	P G	X	0.20 ¹³⁴	0.20 ¹³⁴
Rappahannock (ex Pommern—see GERMANY)	—	—	—	—	—	—	0.20 ¹⁸¹	0.20 ¹⁸¹
Ravalli ⁷⁶	WGI	100	Pacific Coast Co.	300, 600	P G	—	0.40 ¹⁰²	0.40 ¹⁰²
Rayo ¹³⁵	KTL	250	Standard Transportation Co.	300, 600	P G	X	0.20	0.20
Redondo ⁹⁰	WBM	100	Alaska S.S. Co.	300, 600	P G	—	0.20	0.20
Redwood ⁹⁰	WSD	100	Pacific-American Fisheries Inc.	300, 450, 525, 600	P G	—	0.20	0.20
Reid ¹³⁵	NTU	—	Navy	300, 600	P G	X	0.20	0.20
Reid ¹³⁵	KVZ	200	Mexican Telegraph Co.	300, 600	P G	X	0.20 ¹³⁴	0.20 ¹³⁴

9 a.m. to midday,
2 p.m. to 5 p.m.,
8 p.m. to 10:30 p.m.

Line	Ship	Company	Port	Agent	Remarks	Notes
1	Relief Lightship 94 or 53	Government	—	—	—	0.20
2	Remlik 400	Willis S. Kilmer	200	—	—	0.20 101 0.40 102 0.40 103
3	WYN 114 130	Army	35	—	—	—
4	WSU 150	Chile S.S. Co. Inc.	150	—	—	0.20 101 0.40 102 0.40 103
5	KRP 100	Merritt & Chapman Derrick and Wrecking Co.	100	—	—	0.40
6	KRM 200	Merritt & Chapman Derrick and Wrecking Co.	200	—	—	0.20 101 0.40 102 0.40 103
7	WIU 100	Commercial Pacific Cable Co.	100	—	—	0.20 101 0.40 102 0.40 103
8	WSR 100	Columbia River Packers' Assn.	100	—	—	0.20
9	—	—	—	—	—	—
10	NTX 50	Navy	50	—	—	0.20 124 0.20 125
11	KXR 200	New England S.S. Co.	200	—	—	0.20 101 0.40 102 0.40 103
12	WTR 200	Standard Oil Co., California	200	—	—	0.20 101 0.40 102 0.40 103
13	KEG 200	Mallory S.S. Co.	200	—	—	0.20 101 0.40 102 0.40 103
14	KZN 100	State of Florida (Shellfish Commission)	100	—	—	0.20
15	KDY 200	Kerr S.S. Line	200	—	—	0.20 101 0.40 102 0.40 103
16	NUT 100	Navy	100	—	—	0.20
17	NWT 100	Navy	100	—	—	0.20
18	NTZ 100	Navy	100	—	—	0.20 144
19	NLR 300	Department of Commerce, Bureau of Fisheries	300	—	—	—
20	WWR 200	San Francisco & Portland S.S. Co.	200	—	—	0.20 101 0.40 102 0.40 103
21	NKR 300	Standard Transportation Co.	300	—	—	0.20 101 0.40 102 0.40 103
22	KSW 300	Mallory S.S. Co.	300	—	—	0.20 101 0.40 102 0.40 103
23	KEB 300	Mallory S.S. Co.	300	—	—	0.40 102
24	—	—	—	—	—	—
25	NQV 100	Navy	100	—	—	0.20 124 0.20 101 0.40 102
26	KVO 200	Sibiria Steamship Corporation	200	—	—	0.20 101 0.40 102 0.40 103
27	WHH 100	Alaska Fisherman's Packing Co.	100	—	—	0.20 101 0.40 102 0.40 103
28	KSL 200	American Line	200	—	—	0.20 124
29	NTF 100	Navy	100	—	—	0.20 101 0.40 102 0.40 103
30	WSS 100	Columbia River Packers' Association	100	—	—	0.20
31	KSO 200	American Line	200	—	—	0.20 101 0.40 102 0.40 103

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
UNITED STATES OF AMERICA—contd.								
Salem ¹¹⁵	NTP	—	Navy	300, 600	P G	—	Franks. 0.20 ¹¹⁴	Franks. —
Sambia (ex-German vessel—see GERMANY)	—	—	—	—	—	—	—	—
Samsoet ¹¹⁵	NUU	—	Navy	300, 600	P G	N	0.20	—
Samson ¹¹⁵	NKS	—	Navy	300, 600	P G	N	0.20	—
Samson WOS ¹¹⁴	WOS	100	Columbia Contract Co.	300, 600	P G	N	0.20	—
Samuel Mitchell ^{70 115}	WEJ	—	Harop Transportation Co.	300, 600	P G	—	0.10	—
San Diego ¹¹⁵	NCZ	—	Navy	300, 600	P G	N	0.20	—
San Francisco KRT ⁷⁶	KRT	200	United States Steel Products Co.	300, 600	P G	X	0.20 ¹⁰¹	—
San Francisco NTQ ¹¹⁵	NTQ	—	Navy	300, 600	P G	N	0.40 ¹⁰²	—
San Jacinto ⁷⁶	KES	200	Mallory S.S. Co.	300, 450, 600	P G	N	0.20 ¹⁰¹	—
San Juan KGJ ⁷⁶	KGJ	300	New York & Porto Rico S.S. Co.	300, 450, 600	P G	N	0.40 ¹⁰²	—
San Marcos ⁷⁶	KEK	200	Mallory S.S. Co.	300, 600	P G	X	0.40	—
San Mateo ¹¹⁵	KLV	300	Mallory S.S. Co.	300, 600	P G	X	—	—
San Pedro ¹¹⁵	WZZ	30	San Mateo S.S. Corporation (United Fruit Co.)	300, 600	P G	X	0.20 ¹⁰¹	—
San Ramon ⁷⁶	WNW	150	Army	400	O	X	0.40 ¹⁰²	—
Santa Alicia ⁷⁶	WSJ	150	San Ramon S.S. Co.	300, 600	P G	X	0.20 ¹⁰¹	—
Santa Ana ⁸⁰	WAL	100	W. R. Grace & Co.	300, 600	P G	X	0.40 ¹⁰²	—
Santa Barbara ⁷⁶	WBI	200	Alaska S.S. Co.	300, 600	P G	X	0.20 ¹⁰¹	—
Santa Catalina ⁷⁶	WBC	200	Grace Steamship Co. (W. R. Grace & Co.)	300, 450, 600	P G	X	0.40 ¹⁰²	—
Santa Cecilia ⁷⁶	WBB	200	Atlantic and Pacific S.S. Co. (W. R. Grace & Co.)	300, 600	P G	X	0.20 ¹⁰¹	—
Santa Clara ⁷⁶	WBA	200	Nafra Co. Inc.	300, 600	P G	X	0.40 ¹⁰²	—
Santa Cruz WBD ⁷⁶	WBD	200	Atlantic & Pacific S.S. Co. (W. R. Grace & Co.)	300, 600	P G	X	0.20 ¹⁰¹	—
Santa Maria KWU ⁷⁶	KWU	—	Sun Co.	300, 600	P G	—	0.40 ¹⁰²	—
Santa Marta ¹¹⁵	KLG	500	Santa Marta S.S. Corporation	300, 600	P G	N	0.20	—

Ship	Station	Company	Capacity	Notes	Remarks
Santa Rosa 76	WBO	Grace Steamship Co. (W. R. Grace & Co.)	300	..	0.20 101 0.40 102
Santa Rosalia 76	KLO	United States Steel Products Co.	200	..	0.20 101 0.40 102
Santiago 76	KWE	New York & Cuba Mail S.S. Co...	300	..	0.20 101 0.40 102
Saramacca 119	KLH	Saramacca S.S. Corporation (United Fruit Co.)	350	..	0.20 101 0.40 102
Saratoga KWS 76	KWS	New York & Cuba Mail S.S. Co.	300	..	0.20 101 0.40 102
Saratoga NTR 135	NTR	Barber & Co. (Inc.)	200	..	0.20 101 0.40 102
Satsuma KJI 76	KJI	Navy	200	..	0.20 101 0.40 102
Satum 135	NNM	A. J. Duexel	200	..	0.20 101 0.40 102
Sayonara 4 89	KYJ	Navy	200	..	0.20 101 0.40 102
Schley 135	NKT	Navy	200	..	0.20 101 0.40 102
Scorpion NTT 135	NTT	Navy	200	..	0.20 101 0.40 102
Seafarer	WPL	Seafaur Navigation & Salvage Co.	100	..	0.20 101 0.40 102
Sea Rover 80 114	WRP 135	Ship Owners & Merchants' Tug-boat Co.	100	..	0.20 101 0.40 102
Seattle NWE 135	NWE	Navy	200	..	0.20 101 0.40 102
Sebago 135	NUV	Navy	200	..	0.20 101 0.40 102
Security 76	KSJ	Standard Transportation Co.	200	..	0.20 101 0.40 102
Seandbee 76	WFS	Cleveland & Buffalo Transit Co...	150	..	0.20 101 0.40 102
Segurancra 76	KWG	Federal Steamship Corporation	200	..	0.20 101 0.40 102
Seminole 137	NRS	U.S. Revenue Cutter Service	150	..	0.20 101 0.40 102
Senator 76	WGS	Pacific Coast Co.	100	..	0.20 101 0.40 102
Senator Bailey 76 114	KGS	Gulf Refining Co.	200	..	0.20 101 0.40 102
Seneca 137	NRE	U.S. Revenue Cutter Service	300	..	0.20 101 0.40 102
Serapis (ex-German vessel—see GERMANY)	—	—	—	..	0.20 101 0.40 102
Setos (ex-German vessel—see GERMANY)	—	—	—	..	0.20 101 0.40 102
Severn 135	NZB	Navy	100	..	0.20 101 0.40 102
Seward 80	WAV	Seward Navigation Co.	100	..	0.20 101 0.40 102
Shaw 135	NKU	Navy	150	..	0.20 101 0.40 102
Shenango 76 135	KTC	Gulf Refining Co.	150	..	0.20 101 0.40 102
Sheridan 139 139	WJX	Army	300	..	0.20 101 0.40 102
Sherman KMQ 76	KMQ	Chile Exploration Co.	250	..	0.20 101 0.40 102
Sherman WXX 139 139	WXX	Army	300	..	0.20 101 0.40 102
Shubrick 135	NWU	Navy	150	..	0.20 101 0.40 102
Sialia 80	WFY	Estate of J. K. Stewart	150	..	0.20 101 0.40 102
Sierra 131	WHJ	Oceanic S.S. Co.	150	..	0.20 101 0.40 102
Silver Shell 76	WIA	Shell Co. of California	400	..	0.20 101 0.40 102

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
UNITED STATES OF AMERICA—contd.								
Sioux NUV	NUW	—	Navy	300, 600	P G	N	Francs. 0.20	Francs. —
Sir Thomas Shaughnessy 107	WFW	—	Jenkins Steamship Co. . . .	300, 600	P G	—	0.10	—
Sixaola 118	KDS	500	Sixaola S.S. Corporation (United Fruit Co.)	300, 600	P G	N	0.40	—
S. M. Fischer 114	WPH	200	Reid Wrecking Co. . . .	300, 600	P G	X	0.10	—
Smith 118	NSQ	—	Navy	300, 600	P G	—	0.20 114	—
Snohomish 117	NRF	75	U.S. Revenue Cutter Service	300, 600	P G	N	0.20 101	—
S. O. Co. No. 91 110	WTU	100	Standard Oil Co., California	300, 600	P G	X	0.20 103	—
S. O. Co. No. 93 110	WTY	100	Standard Oil Co., California	300, 600	P G	X	0.20 101	—
S. O. Co. No. 95 110	WTZ	100	Standard Oil Co., California	300, 600	P G	X	0.40 103	—
Socony 118	KTX	250	Standard Transportation Co. . .	300, 600	P G	—	0.20 101	—
						9 a.m. to midday, 2 p.m. to 5 p.m., 8 p.m. to 10.30 p.m.	0.20	—
Solace 115	NST	—	Navy	300, 600	P G	—	0.20 114	—
Somers 115	NWV	—	Navy	300, 600	P G	N	0.20	—
Somerset KQS 10	KQS	200	Ocean S.S. Co. (Savannah Line)	300, 450, 600	P G	—	0.20 101	—
Somerset KSU 10	KSU	200	Standard Oil Co. (New Jersey)	300, 450, 600	P G	X	0.40 103	—
Sonoma NTG 115	NTG	—	Navy	300, 600	P G	—	0.20 101	—
Sonoma WHM 111	WHM	250	Oceanic S.S. Co. . . .	300, 600, 1,800	P G	—	0.40 103	—
Sotomomo 115	NUX	—	Navy	300, 600	P G	—	0.20 114	—
South American 10	WEO	125	Chicago, Duluth & Georgian Bay Transit Co.	300, 600	P G	N	0.20 101	—
South Carolina 115	NSW	—	Navy	300, 600	P G	—	0.40 103	—
South Dakota 115	NSX	—	Navy	300, 600	P G	—	0.20 101	—
Southerner 10	KJH	—	Southland Steamship Co. . .	300, 600	P G	—	0.20 114	—
Southerly 115	NJY	—	Navy	300, 600	P G	N	0.10	—
Spokane 10	WGE	100	Pacific Coast Co. . . .	300, 600	P G	N	0.20 114	—
Spring Carroll 114 115	WZU	—	Army	1,200	P G	N	0.20 101	—
Statensfor Krigsflot (ex-German vessel—see GERMANY)	—	—	—	—	O . .	X	0.40 103	—

[illegible]

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-lengths in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
UNITED STATES OF AMERICA—contd.								
Texas NCD ¹³⁵	NCD	—	Navy	300, 800	P G	—	Frans.	Frans.
The Harvester ⁷⁶	WCR	200	Wisconsin Steel Co.	300, 800	P G	X	0.20 ¹³⁴	—
The Limit ^{76 119}	WCV	100	Whitney Bros. Co.	300, 800	P G	X	0.10	—
Theodore Roosevelt ⁷⁶	WCT	100	Roosevelt S.S. Co.	300, 800	P G	X	0.10	—
Thetis NRT ¹³¹	NRT	150	U.S. Revenue Cutter Service	300, 800	P G	X	0.20	—
Thomas ^{139 136}	WXM	300	Army	600	P G	N	0.20	—
Thornton ¹³⁵	NWX	—	Navy	300, 800	P G	N	0.20	—
Tiger KIT ⁷⁶	KIT	—	Standard Transportation Co. of Delaware	300, 800	P G	—	0.20 ¹⁰¹	—
Tillamook ¹³⁵	NWW	—	Navy	300, 800	P G	N	0.40 ¹⁰²	—
Tingey ¹³⁵	NWV	—	Navy	300, 800	P G	N	0.20	—
Tionesta ⁷⁶	WCA	150	Great Lakes Transit Corporation	300, 800	P G	N	0.20	—
Tivives ¹¹⁸	KMI	500	Tivives Steamship Corporation (United Fruit Co.)	300, 800	P G	N	0.10	—
Toledo ⁷⁶	KTV	200	Sun Co.	300, 800	P G	X	0.40	—
Tonopah ¹³⁵	NUN	—	Navy	300, 800	P G	—	0.20 ¹⁰¹	—
Topila ⁷⁶	KKE	200	East Coast Oil Co.	300, 450, 800	P G	—	0.40 ¹⁰²	—
Tormentor ⁷⁶	KFN	100	Freight & Tampico Fuel Oil and Transportation Corporation	300, 800	P G	X	0.20 ¹⁰¹	—
Traffic ¹³⁵	NVA	—	Navy	300, 800	P G	N	0.40 ¹⁰²	—
Transfer ¹³⁵	NVB	—	Navy	300, 800	P G	N	0.20	—
Trinidadian ⁷⁶	KNO	200	Gulf Refining Co.	300, 800	P G	X	0.20 ¹⁰¹	—
Tripp ¹³⁵	NUQ	—	Navy	300, 800	P G	—	0.40 ¹⁰²	—
Triton NVC ¹³⁵	NVC	—	Navy	300, 800	P G	—	0.20 ¹³⁴	—
Truxton ¹²⁵	NUS	—	Navy	300, 800	P G	—	0.20	—
Tucker ¹²⁵	NKV	—	Navy	300, 800	P G	—	0.20 ¹³⁴	—
Turrialba ¹¹³	KDI	500	Turrialba S.S. Corporation (United Fruit Co.)	300, 800	P G	N	0.20	—
Tuscarora ¹³⁷	NRL	100	U.S. Revenue Cutter Service	300, 800	P G	N	0.20	—
Twilite ^{84 76}	KPO	—	Standard Oil Co. (New Jersey)	300, 800	P G	—	0.20 ¹⁰¹	—
Ulysses KPU ⁸⁵	WPC	100	Puget Sound Tug-Boat Co.	300, 800	P G	X	0.40 ¹⁰²	—
Unadilla ¹³⁵	KPU	300	Panama Railroad Co.	300, 800	P G	N	0.20 ¹⁰¹	—
Unadilla ¹³⁵	WGU	200	Pacific Coast Co.	300, 800	P G	N	0.20 ¹⁰²	—

Utah 125	NVE	100	Navy	300, 800	P G	0.20
Valdez 60	WAK	100	Alaska S.S. Co.	300, 800	P G	0.20
Vanad's 400	KYT	300	Morton F. Plant	300, 600	P G	0.20
Vadero 435	WHV	50	G. Allan Hancock	300	P G	0.20
Ventura 480	WOW	100	J. D. Spreckels	300, 900	P G	0.40
Ventura 131	WHL	150	Oceanic S.S. Co.	300, 600, 1,800	P G	0.20
Vermont 125	NVK	100	Navy	300, 800	P G	0.20
Vesta KTS 76	KTS	200	Standard Transportation Co.	300, 450, 600	P G	0.20
Vestal 135	NMC	—	Navy	300, 800	P G	0.20
Vesuvius 135	NVM	—	Navy	300, 800	P G	0.20
Vicksburg 125	NVN	—	Navy	300, 800	P G	0.20
Victoria WAD 16	WAD	100	Alaska S.S. Co.	300, 600	P G	0.20
Vigo KMC 76	KMC	—	Vigo Steamship Co.	300, 800	P G	0.20
Villalobos 135	NVP	—	Navy	300, 800	P G	0.40
Virginia NVR 135	NVR	—	Navy	300, 800	P G	0.20
Virginia WPH 76	WPH	150	Goodrich Transit Co.	300, 800	P G	0.20
Virginian WKV 80	WKV	350	American-Hawaiian S.S. Co.	300, 600	P G	0.10
Vixen NSU 135	NSU	—	Navy	300, 800	P G	0.20
Vulcan NVT 135	NVT	—	Navy	300, 800	P G	0.20
Waban 126	NVH	—	Navy	300, 800	P G	0.20
Wadsworth 135	NKW	—	Navy	300, 800	P G	0.20
Wahneti 125	NVI	—	Navy	300, 800	P G	0.20
Wainwright 135	NKX	—	Navy	300, 800	P G	0.20
Waiwa 676	KYT	150	H. S. Harkness	300, 600	P G	0.20
Walke 135	NWL	—	Navy	300, 800	P G	0.20
Wallula 80 114	WPF	100	Port of Portland	300, 450, 525, 600	P G	0.40
Wanda 125	NWZ	—	Navy	300, 600	P G	0.20
Wapama 76	WMG	100	Charles R. McCormick & Co.	300, 600	P G	0.40
Warren 130 128	WXN	300	Army	600	P G	0.20
Warrington 135	NWD	—	Navy	300, 800	P G	0.20
Warrior KYW 400	KYW	300	Alexander S. Cochran	300, 600	P G	0.20
Wasp	NSV	—	Naval Militia	300, 600	P G	0.20
W. B. Keene 114 76	KWK	200	Savannah-New York Transportation Co.	300, 600	P G	0.40
W. C. Teagle 76	KTY	—	Standard Oil Co. (New Jersey)	300, 600	P G	0.20
Wellington KMR 76 114	KMR	—	Cook-Cumner Steam Ship Co.	300, 600	P G	0.20
Western States 80	WED	125	Detroit & Cleveland Nav. Co.	300, 440, 500, 600	P G	0.40
Westoil 76	KJT	—	Standard Oil Co. of New York	300, 600	P G	0.20
Westwego 76	KGE	200	Union Petroleum S.S. Co.	300, 450, 600	P G	0.40
W. F. Burrows 80	WHG	100	Libby, McNeill & Libby Co.	300, 450, 525, 600	P G	0.20

NOTES

Ship Stations

1. The station is operated and controlled by the Government; it belongs to the Imperial Inspectorate of the radiotelegraph service, Trieste.

2. During the voyage between Trieste and North America, or vice versâ.

3. During the voyage between Trieste and South America, or vice versâ.

4. Yacht.

5. Fast day service between Trieste and Venice.

6. Trieste-Alexandria Line.

7. Trieste-India, Eastern Asia Line.

8. Trieste-North and South America Line.

9. Trieste-Bombay Line.

10. Operated and controlled by the Department of Customs, Ottawa.

11. Operated and controlled by the Société Anonyme Internationale de Télégraphie sans fil, Brussels.

12. Belgian Government steamer on the service between Ostend and Dover. The station is operated and controlled by the Belgian Government.

13. Correspondence restricted to Nieuport, North Foreland, and the steamers of the same line.

14. During the crossings, which take place three times a day in each direction. Time of crossing, about three hours. Departures: from Ostend at about 10.45 a.m., 3.30 p.m., and 11 p.m.; from Dover at about 11 a.m., 4.30 p.m., and 11 p.m.

15. In the case of radiotelegrams exchanged either between the steamers and Nieuport or between two steamers, no special ship charge. The total wireless charge is fixed at fr. 1.50 per radiotelegram of ten words or less, with fr. 0.10 additional for each word over ten. For correspondence with North Foreland, the ship charge is fr. 0.10 per word, with a minimum of fr. 1.00 per radiotelegram.

16. Operated and controlled by the Department of the Naval Service, Ottawa.

17. Operated and controlled by the Marconi Wireless Telegraph Company of Canada, Ltd., Montreal.

18. Operated and controlled by the Department of Marine, Ottawa.

19. Operated and controlled by the Department of Railways and Canals, Ottawa.

20. Lighthouse inspection ship. The station is operated and controlled by the Ministry of Marine.

21. Buoy inspection ship. The station is operated and controlled by the Ministry of Marine.

22. Public correspondence may be admitted, without ship charge, if there is no naval correspondence. Private radiotelegrams must be drawn up in plain language.

23. No ship charge.

24. Sailing vessel.

25. Operated and controlled by the Compagnie Française Maritime et Coloniale de Télégraphie sans Fil, Paris.

26. Ship engaged in a regular service between France on the one hand, and Corsica, Algeria, and Tunis on the other.

27. Engaged in a regular service between France and Corsica.

28. Ship engaged in a regular service between France and Algeria.

29. Ship engaged in a regular service between France, Algeria, and Tunis.

30. Ship engaged in a regular service between Calais and Dover.

31. Operated and controlled by the Deutsche Betriebsgesellschaft für drahtlose Telegraphie, Berlin.

32. In the case of radiotelegrams exchanged with British coast stations, the coast charge is fr. 0.30 per word with a minimum of fr. 1.80 per radiotelegram. In the case of radiotelegrams intended for the United Kingdom, a charge of fr. 0.35 per word, with a minimum of fr. 2.10 per radiotelegram, is made for the coast charge and the charge for transmission over the telegraph lines.

33. For radiotelegrams liable to charge.

34. Official correspondence with Sassnitz and Trälleborg, and also with the other ferry-boats of the Sassnitz-Trälleborg line, concerning the railway traffic.

35. Public correspondence with Sassnitz and Trälleborg, and also with the other ferry-boats of the Sassnitz-Trälleborg line.

36. Ferry-boat. The service of the Sassnitz-Trälleborg line being performed alternately by German and Swedish ferry-boats, it is necessary to replace the name of the ship station in the address of radiotelegrams by one of the following indications:—

Ferry-boat A for the boat leaving Sassnitz in the morning;

Ferry-boat C for the boat leaving Sassnitz in the afternoon;

Ferry-boat B for the boat leaving Trälleborg in the morning;

Ferry-boat D for the boat leaving Trälleborg in the afternoon.

37. The ship charge for radiotelegrams intended for the ferry-boats is, without regard to the nationality of the boats, fr. 0.18 per word, with a minimum of fr. 1.80, when the radiotelegrams are transmitted via Sassnitz; and fr. 0.14 per word, with a minimum of fr. 1.40, when they are transmitted via Trälleborg.

38. Special correspondence, relating to the service of the ship.

39. During the time of the voyage between New York and the West Indies.

40. Monday, 7 a.m. to 1 p.m.; Tuesday, noon to 8.30 p.m.; Wednesday, 2 p.m. to 6 p.m.; Thursday, noon to 8.30 p.m.; Friday, 7 p.m. to 10 p.m.; Saturday, noon to 8.30 p.m.; Sunday, 7 a.m. to 1 p.m., 2 p.m. to 8.30 p.m.

41. Operated and controlled by the Société Française Radio-électrique, Paris.

42. 6 a.m. to midnight, continuous service; midnight to 6 a.m., only during the first ten minutes of each hour.

43. Operated and controlled by the owner; the accounts are settled by the Deutsche Betriebsgesellschaft für drahtlose Telegraphie, Berlin.

44. Operated and controlled by the Marconi International Marine Communication Company, London.

45. The wave-length ordinarily employed is 450 metres.

46. The wave-length ordinarily employed is 400 metres.

47. Correspondence limited to Caister-on-Sea, North Foreland, and Scheveningen Port.

48. Communicates only with Seaforth (Liverpool).

49. The ship charge is reduced to fr. 0.15 per word with a minimum of fr. 0.90 per radiotelegram when the ship is engaged on voyages between the United Kingdom and ports less than 1,000 nautical miles (1,855 km.) distant from the United Kingdom.

50. In the case of radiotelegrams exchanged with coast stations of the United Kingdom, the coast charge is fr. 0.15 per word with a minimum of fr. 1.50 per radiotelegram. In the case of radiotelegrams exchanged with French coast stations, the coast charge is fr. 0.15 per word without a minimum.

51. Operated and controlled by Turnbull, Martin and Company, London.

52. Operated and controlled by the Marconi Wireless Telegraph Company of Canada, Montreal, for and on behalf of the Marconi International Marine Communication Company, Ltd., London.

53. Operated and controlled by the officers on board.

54. Operated and controlled by the Marconi Wireless Telegraph Company of America, New York, on behalf of the Marconi International Marine Communication Company, London.

55. The ship charge is reduced to fr. 0.10 per word with a minimum of fr. 1.00 when the ship travels between Victoria, Vancouver, and Seattle.

56. Steamer performing the day service between Flushing and Queenborough; from Flushing 11 a.m., from Queenborough 11.30 a.m.

57. Steamer performing the night service between Flushing and Folkestone; from Flushing midnight, from Folkestone 10.30 p.m.

58. Additional wave of 500 metres for communication with Scheveningen Port.

59. Public correspondence restricted to radiotelegrams exchanged by the steamers of the Zeeland Company, between themselves and with the Scheveningen Port and North Foreland coast stations.

60. Public correspondence restricted to radiotelegrams exchanged by this steamer either with the Scheveningen Port and North Foreland coast stations, or with the other steamers of the Batavier-Line. When, however, on special occasions the ship departs from the normal route the station conducts general public correspondence.

61. Public correspondence may be admitted, without ship charge, if there is no official correspondence.

62. In the case of radiotelegrams transmitted through Scheveningen Port or exchanged with the other stations of the Zeeland Company, the total radiotelegraph charge is fr. 0.20 per word with a minimum of fr. 2.00 per radiotélégram. In the case of radiotelegrams exchanged through North Foreland, the ship charge is fr. 0.20 per word with a minimum of fr. 2.00 per radiotelegram, and the coast charge is fr. 0.15 per word with a minimum of fr. 1.50 per radiotelegram. For radiotelegrams intended for the United Kingdom, however, a charge is made (in addition to the ship charge) of fr. 0.20 per word with a minimum of fr. 2.00 per radiotelegram, representing the coast charge of North Foreland, and the inland wire charge.

63. In the case of radiotelegrams transmitted through North Foreland, the coast charge is fr. 0.15 per word with a minimum of fr. 1.50 per radiotelegram. For radiotelegrams intended for the United Kingdom, however, a charge is made (in addition to the ship charge) of fr. 0.20 per word with a minimum of fr. 2.00 per radiotelegram, representing the coast charge of North Foreland and the inland wire charge.

64. General particulars of the stations on all torpedo-boats of the Royal Navy; when necessary the number of the torpedo-boat is added.

65. General particulars of the stations on all submarines of the Royal Navy; when necessary the number of the submarine is added.

66. Operated and controlled by Compagnia Internazionale Marconi per le Comunicazioni Marittime, Rome.

67. Public correspondence with Constantza-Tunnel only.

68. Operated by the owner (or owners) of the vessel; controlled by the Société Anonyme Internationale de Télégraphie sans fil.

69. The ship charge is reduced to fr. 0.13 per word for correspondence with Russian coast and ship stations.

70. Also, in case of urgency, at any time of the day or night.

71. The station is open during the first and last fifteen minutes of each hour from 8 a.m. to 10 p.m.

72. 3 a.m. to 4 a.m., 6 a.m. to 7 a.m., 9 a.m. to 10 a.m., 11 a.m. to noon, 6 p.m. to 7 p.m., 8 p.m. to 9 p.m., 10 p.m. to midnight.

73. Public correspondence restricted to messages of the officers and crew. Ships proceeding singly may relay urgent messages to the coast on request. In both cases the ship charge will apply.

74. During a voyage not exceeding seven hours: continuous service maintained. During a longer voyage: hours of service 3 a.m. to 4.10 a.m., 7 a.m. to 8.10 a.m., 11 a.m. to 12.10 p.m., 3 p.m. to 4.10 p.m., 7 p.m. to 8.10 p.m., 11 p.m. to 12.10 a.m.—Greenwich time—and during the first ten minutes of each other hour.

75. Operated and controlled by the owner (or owners) of the vessel; the accounts are settled through Siemens Bros. and Company, Woolwich, London, S.E.

76. Operated and controlled by the Marconi Wireless Telegraph Company of America, New York.

77. Exploration steamer: the station is operated and controlled by the Deutscher Seefischerei-Verein, Berlin.

78. The station is open only during the season of navigation (March and April).

79. Operated and controlled by the Marconi International Marine Communication Company, Ltd., London, for and on behalf of the Amalgamated Wireless (Australasia), Ltd., Sydney.

80. Operated and controlled by the owner (or owners) of the vessel.

81. Operated and controlled by the Amalgamated Wireless (Australasia), Ltd., Sydney.

82. During the time that the ship is in the Antarctic regions the station will also use such other wave-lengths as may be found to be necessary.

83. Operated and controlled by the Rio de Janeiro Agency of Marconi's Wireless Telegraph Company, Ltd., on behalf of the Marconi International Marine Communication Company, Ltd.

84. Operated and controlled by the Post Office Department, Ottawa.

85. Operated and controlled by the Marconi Wireless Telegraph Company, of Canada, Montreal, on behalf of the Marconi Wireless Telegraph Company of America, New York.

86. Operated by the Radio Electric Company of Canada, Ltd., Montreal.

87. Operated and controlled by the Compagnie Générale de Radiotélégraphie, Paris.

88. Ship engaged in a regular service between Dieppe and New-haven.

89. In the case of radiotelegrams exchanged with coast stations of the United Kingdom, the coast charge is fr. 0.15 per word, with a minimum of fr. 1.50 per radiotelegram.

90. Operated and controlled by Siemens Bros. and Co., Ltd., Woolwich, London, S.E.

91. Motor-vessel.

92. Accounts are settled through Siemens Bros. and Co., Ltd., Woolwich, London, S.E.

93. The station communicates only with the vessel Marquette and Bessemer No. 1 and the Conneaut Harbor Coast Station.

94. Operated and controlled by the Federal Steam Navigation Company.

95. Steam tug plying between Nieuwediep or Ymuiden and the sea.

96. Operated and controlled by the Government.
97. Pilot-boat.
98. Operated and controlled by the Ministry of Communications.
99. Correspondence restricted to radiotelegrams exchanged with Chosen lighthouses and Japanese warships.
100. Operated and controlled by the Marconi Wireless Telegraph Company of America, for and on behalf of the Société Anonyme Internationale de Télégraphie sans Fil.
101. When the ship is trading in the North and South American service.
102. When the ship is trading in the transoceanic service.
103. The station communicates only with the ship station "Cabrillo" and with the coast stations Avalon (California) and East San Pedro (California).
104. Apparatus used in case of emergency only.
105. Engaged in passenger service on the Great Lakes.
106. The station communicates only with the vessel Marquette and Bessemer No 2 and the Conneaut Harbor coast station.
107. Navigates the Great Lakes.
108. The station only corresponds with other Japanese stations.
109. Surveying ship—Coast and Geodetic Survey.
110. Navigates Long Island Sound.
111. Public correspondence is admitted on the service of the crew.
112. Vessel used for wrecking operations.
113. Operated and controlled by the Tropical Radio Telegraph Company.
114. Tug.
115. Tender engaged in transporting supplies for fixed lightships of the Hawaiian Islands.
116. Mine-planter.
117. Dredge (Engineer Corps).
118. Surveying and exploring ship.
119. Barge.
120. For warships, see AUSTRIA-HUNGARY.
121. For vessels other than warships, see AUSTRIA and HUNGARY respectively.
122. Cable-ship.
123. Ferry-boat.
124. No charge is made for relaying messages.
125. Operated and controlled by the United States Naval Communication Service, Radio, Virginia.
126. Operated and controlled by the United States Department of Commerce.

- 127. Operated by the United States Coast Guard, Treasury Department, Washington, D.C.
 - 128. Operated by the National Electric Signaling Company.
 - 129. Operated by the United States Signal Corps, War Department, Washington, D.C.
 - 130. Transport.
 - 131. Operated by the Federal Telegraph Company.
 - 132. Operated by the Atlantic Communication Company.
 - 133. This call signal is interchangeable among the following tugs :
Defiance, Fearless, Hercules, Sea Rover.
 - 134. During the voyages between Gjedser and Warnemünde.
 - 135. Accounts should be rendered to Pierre Mali, 25, Madison Square, New York (U.S.A.).
 - 136. For official correspondence.
 - 137. Operated and controlled by the United States War Department.
 - 138. Operated and controlled by Nederlandsche Telegraaf Maatschappij "Radio Holland," Amsterdam.
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CALL LETTERS

THE BUREAU INTERNATIONAL DE L'UNION TELEGRAPHIQUE OF BERNE allots to the various nations who are parties to the International Radiotelegraphic Convention combinations of "call" letters which are in turn allotted to ship and land stations. Below we give a list of the letters, and combinations of letters, and the countries to which these have been assigned.

A	All to Germany and Protectorates.	OGA to OMZ	Austria-Hungary.
B	All to Great Britain.	ONA to OTZ	Belgium and Colonies.
CAA to CEZ	Chile.	OUA to OZZ	Denmark.
CFA to CKZ	British Colonies and Protectorates.	PAA to PIZ	Holland.
CLA to CMZ	Spain.	PJA to PJM	Curaçao (Dutch).
CNA to CNZ	Morocco.	PJN to PJZ	Surinam (Dutch).
COA to COZ	Great Britain.	PKA to PMZ	Dutch East Indies.
CPA to CPZ	Bolivia.	PNA to PPZ	Brazil.
CQA to CQZ	Monaco.	PQA to PSZ	Not yet assigned.
CRA to CÜZ	Portugal and Colonies.	PTA to PVZ	Brazil.
CVA to CVZ	Roumania.	PWA to PWZ	Not yet assigned.
CWA to CWZ	Uruguay.	PXA to PZZ	Holland.
CXA to CXZ	Spain.	Q	Reserved for code abbreviations.
CYA to CZZ	Mexico.	R	All to Russia.
D	All to Germany and Protectorates.	SAA to SMZ	Sweden.
EAA to EHZ	Spain and Colonies.	SNA to STZ	Brazil.
EIA to EZZ	Great Britain.	SUA to SUZ	Egypt.
F	All to France and Colonies.	SVA to SZZ	Greece.
G	All to Great Britain.	TAA to TMZ	Turkey.
HAA to HFZ	Austria-Hungary.	TNA to TZZ	Germany and Protectorates.
HGA to HHZ	Siam.	UAA to UMZ	France and Colonies.
HIA to HIZ	Dominican Republic.	UNA to UNZ	Bosnia-Herzegovina.
HJA to HKZ	Colombia (Republic).	UOA to UZZ	Austria-Hungary.
HLA to HNU	Spain.	VAA to VGZ	Canada.
HNV to HNZ	New Hebrides.	VHA to VKZ	Commonwealth of Australia.
HOA to HZZ	France and Colonies.	VLA to VMZ	New Zealand.
I	All to Italy and Colonies.	VNA to VNZ	Union of South Africa.
J	All to Japan and Possessions.	VOA to VOZ	Newfoundland.
KAA to KCZ	Germany and Protectorates.	VPA to VSZ	British Colonies not autonomous.
KDA to KZZ	U.S. of America.	VTa to VWZ	British India.
LAA to LHZ	Norway.	VXA to VXZ	Not yet assigned.
LIA to LRZ	Argentine Republic.	VYA to VZZ	British Colonies and Protectorates.
LSA to LUZ	Great Britain.	W	All to United States of America.
LVA to LVZ	Guatemala.	XAA to XDZ	Mexico.
LWA to LWZ	Norway.	XEA to XMZ	Great Britain.
LXA to LZZ	Bulgaria.	XNA to XSZ	China.
M	All to Great Britain.	XTA to XZZ	Great Britain.
N	All to U.S. of America.	Y	All to Great Britain.
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CALL LETTERS

(Alphabetically arranged)

ALLOTTED TO LAND AND SHIP STATIONS.

(c.s. = cable-ship; f.b. = ferry-boat; g.v. = government vessel; b. = barge; l.s. = land-station; m.v. = motor vessel; s.s. = steam-ship; s.t. = tug; s.v. = sailing vessel; s.y. = steam yacht.)

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JYX	s.s. Siam Maru ...	736	KEX	s.s. Josiah Macy ...	777
JYY	s.s. Burma Maru ...	732	KEZ	s.s. Brazos ...	764
JYZ	s.s. Hozan Maru ...	733	KFA	s.s. City of Columbus ...	767
KAB	s.s. Monrovia KAB ...	599	KFB	s.s. City of Atlanta ...	767
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KAG	Adlergrund Light-ship ...	588	KFH	s.s. Herman Frasch ...	775
KAH	s.s. Heligoland ...	588	KFI	b. I. D. Fletcher ...	776
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KAU	Aussenjade Light-ship ...	588	KFK	s.s. City of Savannah ...	767
KAV	s.s. Norddeich ...	589	KFN	s.s. Tormentor ...	794
KAW	s.s. Swinemünde ...	589	KFO	s.s. Buccaneer ...	765
KAZ	s.s. Danzig ...	588	KFP	s.s. Nacoochee ...	783
KBF	Elbe Lightship Eins ...	588	KFS	s.s. San Francisco KFS ...	622
KBH	s.s. Bremerhaven Lloydhalle ...	588	KFT	s.s. Tasco ...	793
KBK	s.s. Bülk ...	588	KFU	s.s. Lents ...	619
KBM	s.s. Borkum Riff Lighthouse ...	588	KFX	s.s. City of St. Louis ...	767
KBR	Borkum Riff Lightship ...	588	KFY	s.s. City of Montgomery ...	767
KCL	Eiderlotsengaliote Lightship ...	588	KFZ	s.s. Inglewood, California ...	618
KCV	s.s. Sassnitz ...	589	KGA	s.s. Coamo ...	768
KCW	s.s. Weser Lightship ...	589	KGB	s.s. Carolina KGB ...	766
KCX	s.s. Cuxhaven ...	588	KGC	s.s. Luckenbach, No. 2 ...	779
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KDB	s.s. Caracas ...	766	KGE	s.s. Westwego ...	795
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KDF	s.s. Coppename ...	769	KGI	s.s. Oakland, California ...	621
KDG	s.s. Parismina ...	785	KGJ	s.s. San Juan KGJ ...	790
KDH	s.s. Heredia ...	775	KGK	s.s. Edgar F. Luckenbach ...	771
KDI	s.s. Abangarez ...	760	KGL	s.s. Doehra ...	770
KDK	s.s. Atenas ...	763	KGM	s.s. Mexicano KGM ...	781
KDM	s.s. Maracaibo ...	780	KGN	s.s. Portland, Oregon KGN ...	621
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KDP	s.s. Portland, Oregon KDP ...	621	KGP	s.s. Ponce ...	787
KDS	s.s. Sixaola ...	792	KGO	s.s. Edward Luckenbach ...	771
KDT	s.s. Turrialba ...	794	KGR	s.s. Cambridge ...	765
KDU	s.s. Juneau, Alaska ...	563	KGS	s.s. Senator Bailey ...	791
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NAF	<i>l.s.</i> Newport, Rhode Island	620	NEN	<i>g.v.</i> Des Moines	770
	Island NAF	620	NEP	<i>g.v.</i> Dixie	770
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WZC	<i>l.s.</i> Fort Whitman ...	617	XOW	<i>l.s.</i> Foochow ...	579
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WAVES IN WATER, AIR, EARTH, AND ÆTHER

BY J. A. FLEMING, M.A., D.Sc., F.R.S.

WHEN we stand on a high cliff and watch sea waves crested with white foam race a'fter each other towards the shore it is difficult at first sight for the untrained eye to recognise that this apparent movement is not the real one. If, however, we can fasten attention on some patch of floating seaweed or a cork, or even resting seagull, it will be seen that as each wave passes over it, the floating body is merely lifted up, pushed forward, let down, and drawn back, and that in truth it describes a circle or closed curve with its plane in the direction in which the wave appears to travel. Also by two such objects it will be found that each point on the water surface executes a similar motion, but successively in point of time. Accordingly we derive a first idea as to a wave motion—viz., that the various points of some medium execute a periodic or cyclical motion of some kind successively and not simultaneously. When we come to analyse the causes of this kind of motion a little more deeply we find that it essentially depends upon the co-existence in the medium of two qualities at each point—viz., an elastic resistance to some kind of strain, and also an inertia-like quality or something resembling mass in virtue of which the said strain persists after the impressed force or stress creating it is withdrawn.

More especially we may say that it depends upon the power of the continuous medium (in this case the sea water) to store up energy in two forms—viz., (i) in some potential form in consequence of the resistance to some kind of displacement or strain, and (ii) in some kinetic form in virtue of some motion or change in the displacement.

In the case of the water surface waves these two qualities are respectively (i) the resistance which the water offers to being made unlevel, or the potential energy stored up when some portion of the water is raised above the mean level or thrust below it; and (ii) the mass of the water in virtue of which moving water possesses kinetic energy in the same manner as any other moving body.

At each point of the water surface the total energy changes its form cyclically and passes by degrees from potential to kinetic and back again. At certain equidistant points, called a half wave length, it is at any one instant all kinetic or all potential, and at intermediate points it is partly in one form and partly in the other. Hence at any one point and during successive instants of time there is a progressive change in the form of the energy, whilst at any one instant and at successive points along a line called the direction of propagation there is a similar continuous and periodic change in the form of the energy.

If we can imagine ourselves floating along over the wave in such a manner as to keep always above a point where the energy has a maximum value in one form, our speed would be called the *wave velocity*.

The number of complete changes per second at any one point is called the *frequency*, and for all kinds of waves the rule holds good that

$$\text{wave velocity} = \text{wave frequency} \times \text{wave length}.$$

In the case of water surface waves the wave velocity is not independent of the wave length, but on deep water such as the blue ocean the wave velocity varies as the square root of the wave length.

The speed, reckoned in miles per hour, with which deep sea waves travel is given by taking the square root of $2\frac{1}{2}$ times the wave length reckoned in feet.

Such waves are called gravitation waves, because the rise and fall of the water is determined by the weight of the water, or the force causing it to fall towards the centre of the earth.

There is, however, another class of surface water wave called capillary waves, or ripples, which depend upon the fact that the surface of the water, in consequence of surface tension, resists stretching, and behaves to some extent like an elastic membrane. The peculiarity of these capillary waves is that the velocity of the capillary ripple is *less* the greater the wave length, being in this respect the opposite of deep sea waves.

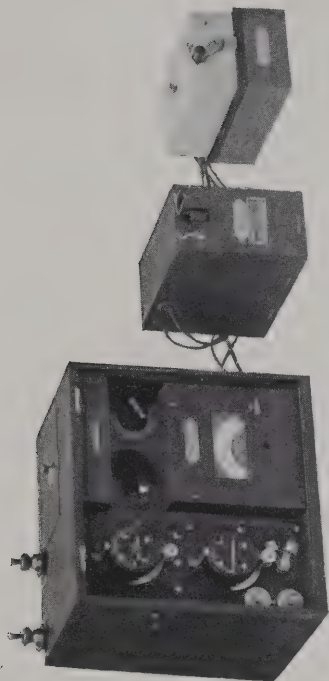
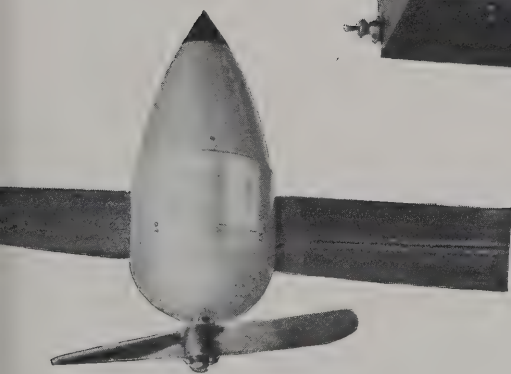
There is no difficulty in thus forming correct conceptions of wave motion when we are concerned with surface waves which we can see, but it is less easy to do so when we direct our attention to waves in the interior of a medium. Thus, for instance, water is slightly compressible, and under great pressure can be squeezed into a rather smaller bulk. But it resists this compression, and as soon as the force is removed it expands to its original volume. In consequence of this compressional elasticity it can have waves of compression and expansion formed in it. These are termed acoustic waves, because the propagation of sound in water depends on such waves.

The velocity of acoustic waves in water has been determined by experiments made in the Lake of Geneva and elsewhere to be 4,707 feet per second at ordinary temperatures. Similar acoustic waves can be formed in air, and in this case, as in the similar waves in water, the actual motion of the air or water particle is a to-and-fro motion in the direction of propagation of the waves. The wave consists in a slight crowding together of the particles at equal distances, and at intermediate points a slight dilatation or rarefaction.

The amplitude of motion of each individual particle is, however, very small. Lord Rayleigh has shown that for the least audible sound of a whistle in air the amplitude of the acoustic wave motion is not more than one-twentieth part of a millionth of an inch.

The velocity of an acoustic wave in air is 1,090 feet at 0°C.

The only type of wave which can be produced in a gas is this wave of compression and rarefaction, or in other words acoustic or sound wave, but in solid bodies such as the earth we have other types of wave possible, due to the different kinds of elasticity present in a solid. Thus solid bodies not only resist compression, but they resist deformation or shearing or torsion, and moreover their compressional elasticity may be different in different directions as well as their other types of elasticity. Hence we can have at least two kinds of waves produced in solid bodies, and these waves may have different velocities in dif-



C.W. TRANSMITTING SET FOR AIRCRAFT USE.

ferent directions. These waves are called respectively the compressional and distortional waves. We have an illustration of this in the case of earthquake waves.

Observation shows that there are in the case of seismic disturbances earth waves of different velocities, and that some waves, which are probably the compressional waves, travel with a velocity of about 10 kilometres per second; whilst other waves, which are probably distortional waves, travel with a less velocity of 5 kilometres or so per second. Lord Rayleigh has also shown that in the case of disturbances originating within a solid body which has a surface there may be surface waves which differ in velocity from distortional or compressional waves passing through the mass of the solid. This is due to the fact that the surface molecules of the solid are in a different condition to the deep-seated molecules as regards constraint. The latter are surrounded on all sides by other molecules, but on the surface such molecule is only acted upon by other molecules over a hemispherical range.

The general law which determines the velocity of a wave is that the velocity is directly proportional to the square root of the elasticity, and inversely as the square root of the density. In applying this law we have to make sure that we use the correct coefficient of elasticity. Elasticity is defined in scientific work as the quotient of stress by strain—that is to say, it is measured by the force or stress required to produce a unit strain or displacement. Consider the simplest case—viz., that of compressional or acoustic waves in a solid. In this case the type of elasticity involved is the resistance of the solid to extension or compression. It is the so-called Young's Modulus of Elasticity. If a bar of metal of cross section S square centimetres and length L has a tension or pull, T , applied to it which increases its length by a small amount, l , then the extension or strain is measured by l/L , and the stress or tension per unit area is T/S . Hence the Young's Modulus of Elasticity, e , for extension, is given by the equation

$$e = \frac{TL}{S\bar{l}}$$

and the velocity of sound in that substance will be given by the equation

$$V = \sqrt{\frac{e}{\bar{d}}} = \sqrt{\frac{TL}{S\bar{d}}}$$

where \bar{d} is the absolute density or mass per unit of volume.

We can illustrate the use of such a formula by applying it to the case of a steel wire. A bar of steel 100 feet in length and $\frac{1}{8}$ square inch in section would be elongated by about 3 inches if a stretching force of 2 tons were applied to it. Hence the Young's Modulus in pounds and inches is equal to 29 million. If we reckon in pounds and feet and use absolute units of force, then this modulus is represented by 134,000 million. The absolute density of steel is 550 lb. per cubic foot. Hence the velocity of sound in steel is the square root of the ratio of 134,000 million to 550, which is 15,500 feet per second. Roughly speaking, this is 3 miles per second.

If, then, we had a steel wire stretching from the earth to the moon, and gave one end a vigorous pull, it would take nearly 22 hours before the pull would be felt at the end in the moon, because it would take this time for the wave to travel 240,000 miles. Or if a steel wire could be

stretched from the earth to the sun, and a pull applied at one end, it would be nearly a year before that pull would make itself felt at the other end.

It will therefore be seen that there are as many types of waves as there are kinds of elasticity. The velocity of a wave of torsion along a steel wire produced by giving it at one end a rotational twist would be quite different from, and very much less than, that of the wave of compression and extension above calculated. In employing the above formula for the predetermination of the wave velocity it is necessary to notice that the elasticity must be that which corresponds to very sudden changes in the volume or shape. For instance, air and all gases have two elasticities, for compression and rarefaction—viz., those corresponding to very sudden (or adiabatic) compression, and that for gradual (or isothermal) compression. The former is greater because when a gas is very suddenly compressed the heat produced is retained in the gas and tends to augment its resistance to compression.

The formula $v = \sqrt{e/\rho}$ was obtained by Newton as an expression for the velocity of sound, but in testing it arithmetically he found that it gave a velocity less than that found by experiment. Laplace subsequently supplied a correction, and showed that Newton had used erroneously the coefficient of elasticity corresponding to very slow instead of very rapid compressions. When this correction is applied there is perfect agreement between the prediction of theory and the result of experiment.

The writer of this article has given lately in the *Proceedings of the Physical Society of London* (Vol. 29, Part III., April 15, 1917) a very simple method of arriving generally at the above formula for wave velocity, to which the reader may be referred for further information.

We have in the next place to consider the waves which can be produced in the imponderable and impalpable medium called the æther, which fills all space. The arguments in favour of such a medium are briefly as follows: We know that light has a finite velocity through space, and that it is close to 300,000 kilometres per second. Also we know by actual experiment that light travels more slowly in transparent media than in vacuo, the ratio of the velocities in vacuo and in the medium being the so-called refractive index.

Also we know by actual experiment, such as the careful researches of Lebedew, Nichols and Hull, and Poynting, that light exerts a pressure upon bodies on which it falls. In the eighteenth century the view, originally enunciated by Newton, was held that light consists in the emission from luminous bodies of small particles called corpuscles. But it follows from this that light should travel more quickly inside transparent substances than in empty space, whereas the opposite is the case. Moreover, it is found that under certain conditions two rays of light falling on the same place can extinguish each other and produce darkness. This phenomenon, called interference, is utterly inexplicable on any corpuscular theory, but is immediately explained on the hypothesis that light is an undulation of some kind taking place in a medium. But if an undulation, then there must be something which undulates, and that something must be an ultramaterial substance, because no ordinary matter of any kind has elasticity great enough or density small enough to propagate undulations through it at the rate of 300,000 kilometres per second.

We are therefore compelled to postulate a special medium, called the æther, which is not ordinary gross gravitative matter, but something of a superior nature. No investigations yet made have enabled us to say that this universal æther is capable of motion of its parts relative to each other, or that it possesses mass in the sense that motion of any part represents kinetic energy associated with the moving portion.

Clerk Maxwell, however, made a remarkable contribution to knowledge when he discovered that the fundamental equations connected with magnetism and electricity lead to a mathematical expression which denotes that electro-magnetic effects are propagated through space as a wave motion, and that the velocity of this wave is identical with that of light. He started from two known and demonstrated facts—viz., that when lines of magnetic flux are thrust into or removed from a closed conducting circuit an electro-motive force is created in the circuit. This is Faraday's law of induction, but Maxwell extended it to non-conducting circuits, or circuits composed of so-called insulators, and he stated it mathematically in the form that the line integral of electric force taken round a unit circuit in a dielectric is numerically equal to the true rate of change of magnetic flux through that circuit.

Again he started from Ampère's law—viz., that the line integral of magnetic force taken round a conductor conveying a current is equal to 4π times the total current through the conductor, and he extended it to dielectrics, and pointed out that an electric displacement produced in a dielectric by an electric force is a current of electricity whilst it is changing. Hence he stated this law in the form that the line integral of magnetic force taken round a unit circuit in a dielectric is equal to 4π times the total electric displacement through the area. Combining these two equations with the expressions for the fact that electric displacement is proportional to electric force multiplied by the dielectric constant (K), and that magnetic flux is proportional to magnetic force multiplied by the magnetic permeability (μ) of the medium, Maxwell arrived at an important differential equation :

$$\frac{d^2D}{dt^2} = \frac{1}{\mu K} \left(\frac{d^2D}{dx^2} + \frac{d^2D}{dy^2} + \frac{d^2D}{dz^2} \right)$$

which indicates that electric strain or displacement (D) is propagated through a dielectric with a velocity numerically equal to

$$1/\sqrt{\mu K}$$

The value of the product μK can be determined for any dielectric by experiments made on the capacity of condenser, of known form, employing that dielectric, and the result is to show that electric and magnetic forces are propagated through dielectrics with the same speed as light. The conclusion is indicated that light itself must be an electro-magnetic phenomenon, and that light waves are electro-magnetic in nature. The older physicists attempted to explain optical phenomena on the basis of the hypothesis that the æther behaved like an elastic solid and that a displacement or shearing or sliding of one part relatively to another could take place which called into play a restoring force or elastic resistance. Another assumption made was that each part of the æther might be capable of rotation relatively to the rest.

The great objection to any of these elastic solid theories is that we have no experimental facts as a basis for them. We do, however, know that an electric strain or displacement can be produced in the æther by electric force, and a magnetic flux by magnetic force, but we have no means of certainly translating in thought these facts of electric strain and magnetic flux into forms of possible mechanical motions or motions of parts of the æther relatively to the rest which can be visualised. Nevertheless the quantities themselves are capable of measurement and mathematical definition. Hence it is better at present to rest satisfied with them as ultimate measurable quantities.

The fact that the æther can suffer electric displacement or strain under electric force is said to be due to its possession of a dielectric quality (K), and the reciprocal of this may be called the electric elasticity of the æther.

Again, the quality of the æther in virtue of which it permits magnetic flux to be produced in it is called its magnetic permeability (μ), and there are good reasons for considering this quality to be analogous to density in material substances. Hence the quantity $1/\sqrt{\mu K}$ is analogous to \sqrt{e}/\sqrt{d} for material substances or to the square root of elasticity by density.

But this is a measure of the velocity of wave motion, and exact experiments have shown that electro-magnetic waves produced in an insulator or in air have exactly the velocity thus predicted.

Of late years another interesting confirmatory proof has been found that light must consist in an undulation of some kind propagated through a medium. It can be shown that waves of all kinds exert a pressure on a surface on which they impinge. Maxwell proved that in the case of light waves the pressure per square centimetre exerted by a beam of light incident normally on a perfectly absorbing or black surface was numerically equal to the energy contained in one cubic centimetre of the incident-light. This latter quantity can be determined by measuring the rise in temperature of the surface on which the light falls, and hence we can predict the pressure.

Now, extremely careful and delicate experiments have been made by Lebedew, and by Nichols and Hull, and by Poynting on this matter, and they show that this Maxwell light-pressure does exist, and has the value theory predicts.

But if light consists of corpuscles shot out from luminous bodies with velocity, V , and if the mass of the corpuscles in one cubic centimetre is M , then it is easily proved that the light pressure must be MV^2 which is exactly double the energy contained in one cubic centimetre. Hence the above-named agreement as obtained by experiment between the pressure and the light energy per c.c. is a proof that we are concerned with a wave motion and not with an emission of corpuscles.

Subsequently to the date of Maxwell's theoretical work, but prior to that of the above-mentioned experimental confirmations of Lebedew and Nichols and Hull, Hertz, following up an early suggestion of G. F. Fitzgerald, had shown us how to create Maxwell's electro-magnetic waves of long wave length by means of electric oscillations in open circuits. Little by little these electro-magnetic waves have been shortened in wave length until by Bose, Righi, and others electro-

magnetic waves of about 0.6 millimetre in length have been created and proved to be capable of reflection, refraction and interference, like light waves.

It is possible by certain methods to isolate from sources of heat and light very long heat waves, which are called Rest-strahlen or residual rays. The wave length of the longest waves so isolated is about 0.006 centimetre. Thus between the longest heat waves emitted by incandescent bodies and the shortest Hertzian waves emitted by oscillators there is a gap or difference of 0.006 to 0.6 cm.—or 1 to 1,000, or nearly 9 octaves.

The coping stone to this magnificent edifice of physical research will be reached when we are able to isolate or create æther waves of the same wave length created both by electro-magnetic oscillations and by processes depending upon incandescence. Nevertheless it must not be assumed that our theories of light or of æther are impregnable. In spite of the fact that the undulatory theory of light gives a satisfactory explanation of certain optical phenomena, it is now well known that there are others, such as the photo-electric effects, which are not amenable to this wave theory explanation, but which seem to call for some hypothesis analogous to the corpuscular theory of light if we are sufficiently to account for them. Hence, even although the achievements of wireless telegraphy and the phenomena of Hertzian waves demand the conception of an æther capable of undulations, we must still search for some broader and more complete theory of light to embrace all the known optical and electrical facts. Meanwhile such quiet scientific work is in abeyance whilst the nightmare of world-war directs all thoughts to the creation or nullification of implements for the destruction of property and life.

HEROISM

SOME RECENT EXAMPLES OF DEVOTION TO DUTY DISPLAYED BY SHIPS' TELEGRAPHISTS.

THE most popular of English Victorian poets, in his *Maud*, drew a word-picture of the sordid life which seemed to be the leading characteristic of the peaceful period during which he was writing. To some extent Alfred Tennyson was correct in his diatribe; normal existence is too apt to bring to the surface only the more sordid features of life, and to do it so persistently as to create the impression that men and women are incapable of rising to higher things. It is as though a sick man, standing by the Pool of Bethesda, waiting for the stirring of the waters by the angel's finger, were in course of his weary vigil to become sceptical as to whether the curative properties of the placid pool had not perished through inanition.

During the last few years we have had a plethora of crises, and the days of placidity seem far away. But the surging of the storm has at all events proved that mankind is far from being the sordid mass of humanity which it appeared. Mr. Godfrey Isaacs, in the plain business-like statements which he annually delivers to his shareholders, has repeatedly referred to the exemplification of the "noble inherent qualities" of wireless operators, which have "in no single instance" been found wanting when the occasion arose. The striking of steel has invariably brought forth a spark from the flint.

We depict on the opposite page the facial lineaments of some ships' telegraphists, who during the twelve months which have elapsed since our last appearance have performed notable deeds of heroism in the execution of their duty. As on a similar occasion last year, we desire to emphasise the fact that they are typical of, and not exceptions to, their comrades engaged on similar work. It will be noticed that in this instance we have associated with the radio operators of the Merchant Service a gallant young naval telegraphist whose story, even in the brief outline which will be found below, carries its own justification. Britain's fighting services and her commercial organisations go hand in hand, marching towards the same goal, animated by the same spirit, and manned by scions of the same indomitable stock. Our list will be found to follow the alphabetical order of surnames:

ERNEST ALEXANDER COROTHIE, born on February 23rd, 1895, at Brechin, in Forfarshire (Scotland), was serving on board the s.s. *Ohio* when the vessel was torpedoed and sunk on March 7th, 1917. The young operator (he was but 22 years of age when he died) with calm deliberation gave up his own life in order to save those of his fellows. The *Ohio* went down four minutes after she had been struck by the enemy missile, and Mr. Corothie, with full knowledge of his fate, stuck to his post, radiating signals of distress from his aërials all the time that his comrades were evacuating the doomed ship. Our gallant French Allies signified their appreciation of this devotion to duty by an official



SHIPS' TELEGRAPHISTS WHO PERFORMED THEIR DUTY IN THE FACE OF
EXTREME PERIL.

(For brief notes on their respective achievements, see pages 854 to 857.)

[To face page 854.

"Mention" in their Army Orders, and by inserting an account of the incident in the *Gazette* of the French Republic.

WILLIAM DOUGLAS CROOKES was born at Aspatria, in Cumberland, on June 18th, 1892. He was serving at sea on July 6th last, when about 4 p.m. the vessel suffered a visitation of U-boat "frightfulness." On this occasion, thanks to the intrepidity and alertness of the wireless telegraphist and the zeal of the rescuers, the vessel was ultimately able to make port. Her master marked his gratitude for Mr. Crookes's zealous performance of his duties by writing a letter to the Marconi Company eulogising his conduct in the following terms:—

"I wish to state that I received great assistance from my wireless operator, who, although badly shaken through shock due to the explosion, remained at his post, and was the means of my being able to obtain the early assistance which enabled me to save my ship. I therefore wish you to compliment Mr. W. D. Crookes on his pluck in remaining by his post at a most critical time. I have already communicated these facts to my owners."

JOHN CUNNINGHAM, born at Millport, in Buteshire, on July 13th, 1898, behaved in a specially gallant manner when his vessel was attacked by an enemy submarine. The German pirate craft on this occasion used her guns, and subjected the British merchantman to so fierce a shell-fire that the captain and chief officer (besides other members of the *personnel*) fell victims to their bombardment. Mr. Cunningham worked manfully at his post all through the engagement, despite the fact that the wireless cabin forms a favourite target for the gunners of these predatory craft. The shell which struck down the captain and chief officer as they stood upon the bridge just above his head disordered his wireless gear in such a way as to render it temporarily useless. Undeterred by the shock and the rain of projectiles which followed, Mr. Cunningham put the apparatus straight, and finally succeeded in getting into communication with Malta. Small wonder that the official report upon the subject pronounced him to be "an able and trustworthy servant, at all times attentive to his duties."

COLIN LESLIE EDWARDS, born at Crewe on April 7th, 1899, and educated at the Robert Bordens College, was on active service when his vessel was torpedoed and sunk on June 23rd, 1917. A naval surgeon who happened to be on board the hapless vessel states that after she was struck by the torpedo Mr. Edwards went along to the captain to receive instructions and to obtain from him the position of the vessel so that he might radiate the information with the SOS signal. The captain gave the required information, but advised the young telegraphist that the situation was too critical and time too short to admit of his delaying to take his place in the boats, even for such a purpose as summoning aid by wireless. The crew were being disembarked and the vessel was likely to founder at any moment. Undismayed by the peril, Mr. Edwards returned to his cabin, transmitted the distress signal and received a reply.

It is a pleasure to know that his efforts resulted in the survivors being picked up about 8 a.m. on the following day, and that Mr. C. L. Edwards is still with us and "carrying on."

DOUGLAS M. HARRIS, wireless operator on board His Majesty's trawler *Floandi*, has won an enduring place in Britain's roll of honour.

His vessel was one of a line of British drifters watching anti-submarine nets in the Straits of Otranto, which separate Italy from Albania. On May 15th, 1917, three Austrian cruisers darted upon them from Pola. The little British craft, utterly helpless *vis-à-vis* with the powerful enemy vessels, refused nevertheless to surrender, and put up a stout fight. Some of them were sunk and others badly damaged before assistance could arrive. The *Floandi* was one of the wirelessly equipped trawlers, and thus received the enemy's particular attention. She was badly damaged in the encounter, and came out of the engagement with four men killed and three wounded out of a total of ten. Operator Harris was found in his cabin, lying across the wireless log, which it was his duty to keep, and upon which he was engaged in writing at the moment when the shell struck him down. The log showed the marks where it was perforated by the enemy's missiles, and bore a line traced by Mr. Harris's pencil as he fell forward in his death agony. The gallantry of the young hero caused him to be "mentioned" in the Admiral's despatches, and his deed remains as a bright example to future generations of his young countrymen.

HAROLD CLEMENT MASTERS was born at Handsworth, in Staffordshire, on March 16th, 1893. This gallant telegraphist found the wireless apparatus under his charge so seriously damaged by an enemy torpedo on September 18th, 1917, as to be beyond repair. After making strenuous efforts to carry out the impossible, Mr. Masters (to use the expression of his captain) "made himself generally useful in every way." The gallantry displayed by the young man on this occasion appears to have been only the consummation of long-continued exemplary conduct in the discharge of his duties on board; for the captain, when writing to his employers to report as to the date on which the ship would be again fit for service, made a special point of asking that Mr. Masters should be again allocated to him as wireless telegraphist.

ERIC BERNARD MORTIMER-FORD was born at "Merry Islington" on August 13th, 1899, and was acting with his vessel when she was torpedoed on the evening of July 4th, 1917. Mr. Ford persisted in his duties all through a period of great peril, and it was not until the ship was upon the point of foundering that he obeyed the captain's orders to quit his post and accompanied him into the lifeboat, wireless operator and captain being the last to leave the ship.

FRANK REID, born at Balgedie, in Kinross-shire, on November 7th, 1893, was serving on a British merchantman when she was shelled by an enemy submarine for upwards of *eight hours*. This "sea-affair" occurred on July 30th, 1917, and the nerve-racking experience of carrying on duty through a lengthy period like this, when the decks are being subjected to an almost continuous shell fire, can hardly be estimated by those who have not gone through it. On this occasion the aërials were shot down, so that Mr. Reid and his gallant comrades were obliged to go aloft and execute repairs under conditions which might well have tried the nerves of seasoned professional fighting men. Fortune on this occasion favoured the British; the enemy was eluded, and Mr. Reid came safely home to receive the well-merited encomiums of the ship-owners.

ROBERT STANLEY SMITH was born at Newcastle, in Staffordshire, on April 9th, 1898. The vessel on which he was serving found itself

engaged by a German underwater craft for 3 hours and 20 minutes on July 12th, 1917. The action started at 4.10 a.m. by the discharge of two torpedoes which missed their mark. Mr. Smith sent out the SOS and received answers from two land stations. About 40 minutes later the enemy vessel came to the surface and started shelling, paying special attention to the wireless cabin. The aerials and spreader poles were shot away. The roof of the wireless room was pierced by fragments of shell, missiles were falling and bursting all around. Mr. Smith stuck bravely to his post, and under this fierce gunfire rigged up new aerials, improvised temporary spreader poles, and radiated his messages. It took $2\frac{1}{2}$ hours of strenuous labour under heavy fire to accomplish this. The captain gave "wireless the highest praise, as "the means of bringing the patrol boat on the scene; whilst the conduct "of Operator Smith was deserving of the greatest appreciation." The British authorities officially commended the gallantry displayed by all concerned on this occasion, and awarded the D.S.O. to the captain.

ON THE ENERGY TRANSMISSION IN WIRELESS TELEGRAPHY.

BY BALTH. VAN-DER-POL, JUN., DOCTS.SC. (UTRECHT).

THE physical laws governing the conditions to be satisfied by the circuits used in a sending or receiving station for wireless telegraphy are generally of a more or less simple nature. The mathematical difficulties, however, in calculating the electric and magnetic forces in the space round a sending antenna are quite different from those to be overcome in designing the closed sending and receiving circuits of a wireless station. This fact can be deduced from certain elementary considerations. When the wave-lengths used are great in comparison with the dimensions of the antenna and the other circuits of the station the currents set up in these circuits will be such that the intensity of a current at a certain moment can be considered to be constant at all sections of one and the same circuit, so that for that moment the intensity of the current depends—apart from the constants of the circuit considered (for instance, on L , C , and r)—only upon the time, and not in the first instance upon the spatial extension of the circuits. The direct consequence of this is that in the differential equations determining the currents and potential differences, time only enters as an independent variable, so that the integral solutions of these equations give the currents and P.D. as dependent upon the time only.

When, on the other hand, the electric and magnetic forces that are set up in the alternating field round a sending antenna are to be determined, terms will occur in the differential equation not only depending upon the time but also upon the co-ordinates of space. However, as soon as this happens the solution of the differential equation will in general present much greater mathematical difficulties.

It is, therefore, not surprising that with the rapid development of the technical side of wireless telegraphy during the last ten years the experiments have gone far beyond the theoretical investigations and that the latter are hardly able to interpret in a mathematical way the experimental results reached.

It would be wrong, however, on that account to neglect or to disregard the theoretical side of the problems arising in radiotelegraphy, for the following reason.

Long before anyone had produced or at least detected electromagnetic waves of wave-lengths as they now traverse the ether in all directions incessantly, the theoretical possibility of producing such waves was shown by the Faraday-Maxwell theory. It was in 1864 that J. C. Maxwell sent to the Royal Society his classical paper under the title of "A Dynamical Theory of the Electromagnetic Field," in which the data were given for the possibility of setting up by purely electric means electromagnetic waves of a longer wave-length than that of visible light. Twenty-four years passed, however, before Hertz, stimulated by an academic prize competition, not only produced the then hardly known waves along wires and measured their wave-lengths, but also generated free waves in the ether and demonstrated experimentally their finite velocity of propagation as predicted by

the Maxwellian theory. These classical experiments opened the way to signalling through space without connecting wires by means of electromagnetic waves of much greater length than those of visible light.

It must, therefore, be borne in mind that in this matter, so essential for wireless telegraphy, theory anticipated the experiments performed a quarter of a century later.

All the theories concerning the transmission of energy as used in wireless telegraphy represent so many solutions of one single differential equation, the so-called wave-equation which must be satisfied both by the electric and by the magnetic forces in the space round the sending-antenna—namely,

$$\left[\nabla^2 - \frac{\mu \varepsilon}{C^2} \frac{d^2}{dt^2} - 4 \pi \mu \sigma \frac{d}{dt} \right] E = 0,$$

where μ is the magnetic permeability, ε the dielectric constant, σ the conductivity of the medium in which the waves travel, and C the velocity of light. Most of the theories of importance for wireless telegraphy only consider undamped waves of *one* frequency at a time, so that the electric and magnetic forces can be written respectively :

$$E e^{-i k c t} \text{ and } H e^{-i k c t},$$

where E and H are independent of the time and the wave-length in ether is represented by $\frac{2 \pi}{k}$, so that :

$$\frac{dE}{dt} = -i k c E,$$

and

$$\frac{d^2 E}{dt^2} = -k^2 c^2 E.$$

Hence the fundamental wave-equation can be written :

$$[\nabla^2 + k^2 \mu \varepsilon + i 4 \pi \mu \sigma k c] E = 0 \quad . \quad . \quad . \quad (1)$$

It may be noticed that the equation allows for many solutions, according to the boundary conditions set by the problem. For instance, quite a different solution is found according as the earth over which the electromagnetic waves are propagated is considered as a plane or as a sphere. We intend to expound in this paper, without entering into too many mathematical details, the different solutions of the general wave-equation which are of importance in connection with the spreading of the wireless waves over the earth's surface.

The first solution of great value for radiotelegraphy was given by Hertz in 1888 and forms the principal foundation of most of the transmission theories. He found the values of the electric and magnetic forces of the wave produced by an idealised Hertzian oscillator, the so-called vibrating electric doublet. This latter mathematical fiction can in general represent the working of an antenna of wireless telegraphy if only the waves produced are long in comparison with the height of the antenna. When this condition is not satisfied the energy distribution round the antenna may be sensibly different from the same produced by an electric doublet, as the author showed.* Hertz assumed his doublet to be vibrating freely in the ether, so that the waves produced by it travel undisturbed in all directions in space.

* *Proc. Phys. Soc. of London*, vol. xxix., June 15th, 1917.

He found that the electric force in the equatorial plane—i.e., the plane cutting the axis of the doublet perpendicularly—is everywhere at right angles to it. Further, at small distances from the doublet the electric force is found to be inversely proportional to the third power of the distance ($\sim r^{-3}$), at greater distances inversely proportional to the square ($\sim r^{-2}$), and ultimately it falls off as the inverse first power of the distance ($\sim r^{-1}$). As the current set up in a receiver is proportional to the electric force at the receiver it follows that the received current will fall off near the sender very rapidly, but at greater distances from it only as the inversed first power. This latter fact is of the utmost importance for wireless telegraphy. Experiments in wireless telegraphy made before Marconi and others worked with electric waves were often carried out with static electric charges. The electric field produced in the equator-plane by a similar doublet, but not oscillating, is for all distances proportional to the inverse third power of the distance, and therefore falls off much more rapidly than in the case of a *vibrating* doublet. It is this law of the inverse first power for a vibrating doublet which, together with the effect of oscillations of accumulating energy in a tuned receiver, made wireless telegraphy over greater distances possible with comparatively low power.

The amplitude of the electric force in the equator-plane, and therefore the current induced in a receiving arrangement, can with the condition assumed by Hertz (vibrator free in space) be represented as:

$$I = \text{Const.} \frac{1}{r^3} \sqrt{1 - \left(\frac{2\pi r}{\lambda}\right)^2 + \left(\frac{2\pi r}{\lambda}\right)^4} \quad (2)$$

which formula can be derived at once from the Hertzian equations.

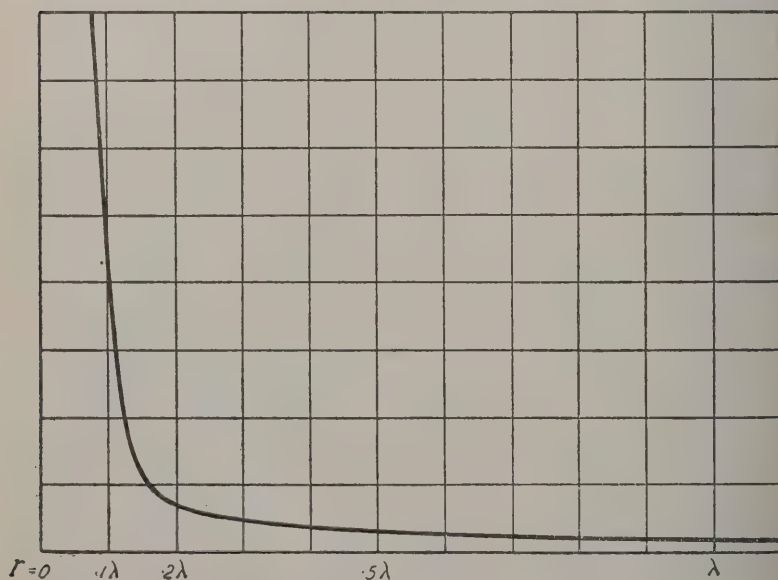


Fig. 1.

The decrease of the received current intensity with distance is represented in Fig. 1 where the rapid decrease near the oscillator and the much lower rate of falling off at greater distances is evident. The ordinates represent the current set up in the receiver and the abscissæ the distances measured in wave-lengths of the receiver from the sending antenna, represented mathematically by the electric vibrating doublet.

Now, in practice the antenna is usually near the earth's surface, so that a modification of the theory for the electric doublet free in space is necessary in order to explain the circumstances found in actual wireless transmissions. We therefore ask what will be the field round such an Hertzian dipol when it is placed on an infinitely extended plane of an ideally low resistance, this plane representing the earth. The condition to be fulfilled by the electric force in such an infinitely conducting plane is that it is at right angles to that surface everywhere. But we saw above that the electric force satisfied this condition with respect to the equator-plane, so that the conducting surface taking the place of the equator plane does not alter the distribution of the electric force. In the case, therefore, of the doublet (representing the sending antenna) being placed at a conducting surface (representing the earth assumed plane) the electric force will follow the same law as is given above and represented in Fig. 1.

In connection, however, with the great variety of forms of antennæ the simple doublet theory cannot be applied for the space very near a sending antenna, even if the wave-length of the latter is great in comparison with the total antenna height. The greater or less complexity of form of the aërials makes it in general very difficult to calculate the electric and magnetic forces set up in their immediate neighbourhood. For bigger distances, say greater than a couple of wave-lengths, the theoretical energy distribution found round a vibrating doublet, represents with a fair degree of approximation the electric conditions set up by an antenna for wireless telegraphy.

Now, some measurements of received currents, made by Duddell and Taylor in the Irish Sea, and of Tissot in France, confirmed for distances up to sixty miles the Hertzian theory in general, though in some of their experiments the received current had a tendency to fall off at a slightly higher rate than inversely proportional to the first power of the distance as demanded by the above sketched theory of Hertz. This finds its explanation in the currents set up in the earth, as a consequence of which energy is dissipated in the form of heat. This could not be the case in the ideally conducting equator plane of Hertz, into which no currents can penetrate to a finite depth. For a finite conductivity, such as the earth actually possesses, the waves will not travel only over the earth but also penetrate to a certain extent into it, which phenomenon is accompanied with a loss of energy, so that the waves arrive at a certain point with a smaller amplitude than would be the case if they travelled entirely *over* an infinitely conducting surface. It appeared, therefore, that in order to represent the conditions actually found in practice the theory needs an extension and has to take into account the finite conductivity of the earth's surface.

This condition was taken into account in a theory developed by J. Zenneck in 1907. He investigated the effect of the earth upon the

propagation of electric waves on the assumption of the earth having a finite conductivity together with a dielectric constant differing from unity. In this theory the earth is again assumed to be a plane, and the waves are only considered at very great distances from the sending station, where, over a short distance, they can be assumed to be plane waves propagated without spherical divergence. This latter condition simplifies the problem considerably, so that its solution can be found by means of fairly elementary mathematical deductions. This theory, which is explained rather fully in English in Professor Fleming's *Principles of Electric Wave Telegraphy*, is that a part of the wave energy will be wasted in the earth, especially if the latter is supposed to consist of dry soil. The electrical nature of the earth's surface has, therefore, according to this theory a considerable influence on the propagation of electric waves over—but also partly through—the earth. Moreover, it was this theory that gave a theoretical explanation of the then already well-known experimental fact that communication over certain soils or sea-water could be obtained much more easily with longer than with shorter waves. Professor Fleming, *e.g.*, who made some calculations with the aid of this theory, shows how great numerically is the influence of the wave-length and the electric nature of the earth's surface for certain transmissions. So, for instance, the amplitude of plane waves of 300 metres length travelling over sea water falls to $\frac{1}{e} = .367$ of its original value after being propagated over a distance of 10,000 km. A wave, however, of a length ten times as great can according to this theory travel over sea a distance 100 times as long before having its amplitude reduced to the same fraction of its original value. On the contrary, a wave of 300 metres propagated over ordinary land surface can only travel 20 km., but a wave ten times as long can travel 2,000 km. before its amplitude is determined to .367 of its original value. These numbers clearly illustrate the advantage of using longer waves for communication over great distances. We must point out that the reduction in amplitude of the waves just mentioned as a consequence of their absorption by the land or sea over which they travel, must not be confused with the falling off of amplitude due to the three dimensional radiation divergence as given in Fig. 1, for in the latter case the reduction of amplitude is wholly determined by the spreading of the same energy over steadily increasing spherical surfaces, while in the theory of *Zenneck plane waves* are assumed, so that no divergence occurs whatever and the wave amplitude would remain the same if transmission was established over an infinitely good conducting surface.

The divergence of the waves from a sending station in all directions, *together with* the finite conductivity of the earth, are taken into account in the theory of Sommerfeld (1909). Here, again, the surface of the earth is supposed to be plane and the wave amplitude at various distances is calculated under the conditions mentioned. This theory is, therefore, a combination of the theory of Hertz together with the Zenneck theory, and it is, therefore, not surprising that the two latter theories appear as special cases in the formulæ of Sommerfeld. As the results of this theory have often been misinterpreted this important solution of the wave-equation may receive a somewhat fuller exposition here.

The author of this theory first deduces a completely exact expression for the electric and magnetic forces at the surface of the earth as a function of the distance between the sending station and the point considered. The sending aerial, again, is mathematically represented by a dipol oscillator as in the Hertzian theory, but now placed at the bounding surface between the air and the earth's surface. The amplitude of the waves found in this way is given by a definite integral involving a cylinder function of zero order. In this form, therefore, the solution does not yield immediate application for the required numerical calculations of the wave amplitude at various distances. In order to render this possible the integral has to be approximated. It is necessary, therefore, to introduce a certain numerical quantity ρ , called the "numerical distance," which for the case of air-earth is dependent upon the real distance considered, r , the wave-length, λ , the dielectric constant and the specific conductivity of the earth, respectively ϵ and σ . It can approximately be expressed as follows :

$$\rho = \frac{\pi r}{\lambda} \cdot \frac{1}{\sqrt{\epsilon^2 + 4 \sigma^2 c^2 \lambda^2}} \quad \dots \quad (3)$$

where c is again the velocity of light ; the air is here supposed to have no conductivity at all and the magnetic permeability both of the air and earth are assumed to be unity.

Since Sommerfeld found that the transmission is wholly determined by the value of this "numerical distance" I have computed the following table giving the approximate values of ρ as a function of the distance for different wave-lengths and conditions of the earth's surface :

Wave- Length.	Sea Water.		Fresh Water.		Moist Earth.		Dry Earth.	
Metres.								
300	$\rho = 55$	$10^{-10} \gamma$	$\rho = 126$	$10^{-8} \gamma$	$\rho = 115$	$10^{-8} \gamma$	$= 24$	$10^{-6} \gamma$
1,000	5	$10^{-10} \gamma$	31	$10^{-8} \gamma$	10	$10^{-8} \gamma$	4	$10^{-6} \gamma$
5,000	.2	$10^{-10} \gamma$	2	$10^{-8} \gamma$	.4	$10^{-8} \gamma$	.2	$10^{-6} \gamma$
10,000	.05	$10^{-10} \gamma$	.5	$10^{-8} \gamma$	.1	$10^{-8} \gamma$	.05	$10^{-6} \gamma$

The following approximate constants were used to calculate the preceding table : *

			Conductivity σ in Electromagnetic units.	Dielectric Constant ϵ .
Sea Water	...	...	10^{-11}	81
Fresh Water	...	...	10^{-14}	81
Moist Earth	...	...	$5 \cdot 10^{-14}$	10
Dry Earth	...	...	10^{-15}	4

Now, the general solution in the form of the definite integral referred to above has been approximated for two different conditions :

When the distance in centimetres from the sending station con-

* More about these constants will be found in the last section of this article.

sidered in such that (for the particular values ϵ and σ of the electrical constants together with the wave-length) the numerical distance ρ , calculated according to (3), is :

- (1) A large quantity ;
- (2) A small quantity compared with unity.

(1) ρ is a large quantity. It appears that in this case the total rather complicated electromagnetic field can be represented mathematically as being composed of two constituents, a , a space wave, and b , a surface wave. The space wave, however, is not of the usual type as found in Hertz's solution, where ultimately the wave-amplitude falls off as the inverse ratio of the distance and is, therefore, proportional to r^{-1} . The space wave in the Sommerfeld theory that accompanies the so-called surface wave diminishes rather more quickly with the distance and its amplitude is proportional to r^{-2} . This finds its explanation in the fact that the space wave while travelling over the boundary surface (air—earth) continually supplies the surface wave with its energy.

The surface waves received their name because both their velocity of propagation and the damping they experience while travelling over the earth's surface are determined by the electrical constants of the air *as well as* of the earth's crust, while, on the other hand, the velocity of propagation and the damping of the space waves, so far as their extension in the air is concerned, are wholly determined by the electrical constants of this latter medium alone. Moreover, the surface waves have a so-called cylindrical divergence, so that, apart from the damping effect, their amplitudes are proportional to the inverse square root of the distance ($\sim r^{-1/2}$).

Now the damping with distance to which the surface wave is due while travelling over the earth, is greater than the damping of the accompanying space waves. Therefore, notwithstanding its bigger divergence diminution, it is the space wave that at very great distances dominates the surface wave.

(2) The solution found for distances from the sender and for the electrical constants of the earth that make ρ a small quantity indicates on the other hand that at such distances the Hertzian theory of ordinary space waves may be applied with a fair degree of approximation, and that, therefore, the value of the wave amplitude to be expected under these conditions will be very near to the value calculated with the assumption of a perfectly conducting earth.

From these considerations it is clear that the mathematical abstraction called a surface wave will, in general, dominate the accompanying space wave at those distances from the sending station that together with the electrical constants of the earth and the wave-length used determine a "numerical distance," ρ , of quite a moderate value. From further theoretical considerations the limits of these values have been found to be near $\rho = .2$ and 2.2 when r is measured in centimetres. The following table gives the limits between which the real distance must lie, corresponding to the different wave-lengths and materials, in order that the surface wave contribution to the total electromagnetic disturbance may be regarded as of importance in comparison with the space wave.

Wave- Lengths.	Sea Water.	Fresh Water.	Moist Earth.	Dry Earth.
Metres.	Km.	Km.	Km.	Km.
300	360-4,000	1·6-18	1·7-19	Up to 1
1,000	From 4,000	6·5-71	20-220	Up to 5
5,000	Nowhere	100-1,100	500-5,500	10-110
10,000	Nowhere.	400-4,400	From 2,000	40-440

It ought to be noticed that nothing special happens within those given limits of distance, but that only from a mathematical point of view the there existing waves can be described as being composed of a surface and a space wave.

Occasionally one finds in the very extensive literature on wireless telegraphy peculiarities attributed to these surface waves that cannot be deduced from their mathematical definition, and it is clear that with such speculations one is apt to be led to conclusions which it is difficult to find a physical basis for. It may further be noticed that the surface waves are not confined to the bounding surface between the air and the earth, but also penetrate to a small extent into the earth while their extension in the air is by far the more important part.

Moreover, it must be borne in mind that the surface waves as deduced in the Sommerfeld theory never occur without the accompaniment of space waves, so that to regard a wireless transmission as wholly constituted by surface waves, attributes to this theory more than can be deduced from it.

There is still another important fact in connection with this peculiar type of electromagnetic waves worth mentioning. The way in which the sending antenna is earthed can have no direct influence on the production of surface waves. Their development cannot be assisted by the use of a direct earth or a balancing capacity, but is wholly determined by the "numerical distance," ρ , as defined above, so that the only circumstances having an influence on the development of surface waves are the wave-length used, the electrical properties of the sea or soil over and through which they travel, and the real distance from the sender considered.

From a further mathematical investigation by Sommerfeld* the fact follows that a suitable combination of a comparatively high dielectric constant, a fairly low conductivity and a short distance may for certain wave-lengths secure even a larger wave amplitude than would be obtained in the case of an infinitely good conducting earth surface, though at larger distances the wave amplitude falls off at a much higher rate than in the ideal case. So for waves of 2,000 metres length travelling over fresh water a greater amplitude can be expected at distances up to 100 km. than a perfectly conducting earth would allow.

As far as I am aware this very unexpected result has never been explained in a physical way. It seems to me, however, that an explanation can be given when the conditions under which the whole

* *Jahrb. der drahtl. Telegr.*, iv., 157 (1911).

theory of Sommerfeld has been derived, are taken into account. The mathematical representative of a sending antenna adopted in this theory is again an electric vibrating doublet of unit moment—*i.e.*, for which the product of the charge at the end of the doublet and its length is equal to unity. When this doublet is now immersed into an infinitely extending insulator of dielectric constant ϵ (greater than unity), the total amount of energy radiated will be greater than the energy that would be emitted by the same oscillator in free ether. Both the electric and the magnetic force set up at various distances will be greater for the case of the insulator than for that of free ether. The energy required in order to maintain the oscillations in the doublet is, therefore, different in the two cases. This latter conclusion may also most probably be drawn for an oscillator placed at the plane bounding surface between the air and a conducting dielectric. From this it would follow that a different total amount of energy will be radiated when the same antenna is placed, say, on sea water or on dry earth. The comparison of the wave amplitudes under various conditions given by the Sommerfeld theory can, therefore, without a further investigation, only be made on the basis of a dipole of constant moment which corresponds with a sending antenna for which the product of the height and antenna current is a constant. The energy required, however, in order to maintain this current is a function of the electrical constants of the material on which this antenna is placed. The favourable effect, therefore, of a material like fresh water with a high dielectric constant but of low conductivity, as pointed out above, seems to be due, not to a better *transmission* of the waves than in the case of a perfectly conducting earth, but to a better *emission* of electromagnetic energy.

In the theories expounded above the earth's surface has been assumed to be a plane extending infinitely in all directions. By doing so no error of importance is introduced if only the waves are considered at distances from the sending station small in comparison with the radius of the earth. It is, therefore, clear that those theories cannot be applied without a further investigation to distances over a quarter of the earth's circumference over which it is now a common practice to receive signals. The problem of the bending of electric waves round the curved surface of the earth, therefore, suggested itself, and has been attacked by several mathematicians, among whom we mention Macdonald, Poincaré, Nicholson, March, and von Rybczyński (the latter two pupils of Sommerfeld), and Love. As the work which these mathematicians have undertaken is of a very complicated nature, it is not to be wondered at that their final results often differ considerably. Even up to the present time agreement can hardly be said to have been reached.

The problem under consideration can shortly be described as follows: Given a Hertzian oscillating doublet near a perfectly conducting sphere situated such that the prolongation of its axis goes through the centre of the sphere. The electric and magnetic forces at all points on the surface of the sphere are to be determined. In order to meet the conditions found in practice of wireless telegraphy the wave-length in ether of the doublet is further assumed to be small in comparison with the radius of the sphere. The infinite conductivity

of the latter has, as a first approximation, been introduced here again to simplify the boundary conditions which the electric and magnetic forces must satisfy.

The problem has been attacked in two different ways :

(a) Macdonald, Poincaré, Nicholson, and Love all find an exact solution in the form of an infinite series of surface zonal harmonics of degree n with coefficients of certain cylinder functions of degree $n + \frac{1}{2}$, where n must be given all integral values between 1 and ∞ . It is important to notice that the series found by Macdonald, Nicholson, and Love are almost identical.

(b) March, on the other hand, found a solution in the form of a definite integral, probably with the intention of avoiding the serious difficulties experienced by the others in the evaluation of the above-mentioned series. He was, however, not successful in the numerical interpretation of his integral, and this work thereupon was taken up by von Rybcziński, who at the same time extended the solution also for a sphere of finite conductivity. Professor Love, however, in a very clear exposition of the whole problem in the *Phil. Trans.* of the Royal Society of London (Series A, vol. 215, p. 105), pointed out an error in March's solution, which, as he puts it, "seems to me to vitiate the whole of the work of March and von Rybcziński." Sommerfeld,* on the other hand, in a recent discussion of the divergence of the different results arrived at comes to the conclusion : "In my opinion the results of von Rybcziński ought to be the base of all further investigations in this matter." It, therefore, seems that final unanimity on the solution of this difficult problem has not yet been obtained.

The evaluation of the series found by Macdonald, Nicholson, and Love is a very delicate matter, and the analysis required in order to obtain a final approximate formula involving the simpler elementary functions is very sensitive to the more or less accurate approximations substituted for the functions occurring in the general series. This may to a great extent be considered the principal reason for the considerable divergence of the results arrived at by different investigations.

If we call H the magnetic force and H_0 its amplitude at the earth surface at an angular distance, θ (measured in radians along a great circle), from an oscillating doublet of unit moment placed at the surface of the earth, the latter being assumed to consist of perfectly conducting material, the result found by Macdonald † may be put into the form (wave-length being measured in kilometers)

$$H = \frac{\cos \frac{1}{2} \theta}{\lambda^2 \lambda^{\frac{1}{2}} \sqrt{\sin \frac{1}{2} \theta}} \left[.07950 e^{-47.89 \lambda^{\frac{1}{2}} \sin \frac{1}{2} \theta} \sin \left(27.65 \lambda^{-\frac{1}{2}} \sin \frac{1}{2} \theta - 2 \pi \frac{t}{T} \right) \right. \\ + .0249 e^{-153 \lambda^{-\frac{1}{2}} \sin \frac{1}{2} \theta} \sin \left(88.1 \lambda^{-\frac{1}{2}} \sin \frac{1}{2} \theta - 2 \pi \frac{t}{T} \right) \\ + .0168 e^{-226 \lambda^{-\frac{1}{2}} \sin \frac{1}{2} \theta} \sin \left(131 \lambda^{-\frac{1}{2}} \sin \frac{1}{2} \theta - 2 \pi \frac{t}{T} \right) \left. \right] \quad (4)$$

* *Jahrb. der drahtl. Telegraphie*, xii., 3 (1917).

† *Proc. of the Royal Soc.*, Series A, vol. 90, p. 50.

which for distances not too short can be simplified into :

$$H_0 = \frac{0.7950}{\lambda^2 \lambda^{\frac{1}{2}}} \frac{\cos \frac{1}{2} \theta}{\sqrt{\sin \frac{1}{2} \theta}} e^{-47.89 \lambda^{-\frac{1}{2}} \sin \frac{1}{2} \theta} \quad (4a)$$

Nicholson's formula *, on the other hand, can be written :

$$H_0 = \frac{1.306}{\lambda^2 \lambda^{\frac{1}{2}}} \sqrt{\sin \theta} e^{-23.8 \lambda^{-\frac{1}{2}} \theta} \quad (5)$$

and, finally, von Rybcziński's † formula becomes :

$$H_0 = \frac{\text{Const.}}{\sqrt{\theta \cdot \sin \theta}} e^{-11.3 \lambda^{-\frac{1}{2}} \theta} \quad (6)$$

The earth's circumference was taken as 40,000 km. in calculating the numerical constants in these formulæ and λ is expressed in kilometres.

From these results it follows that Nicholson and von Rybcziński agree that the amplitude of the magnetic force H_0 can be represented by the expression :

$$H_0 = f(\theta) \cdot e^{-c \lambda^{-\frac{1}{2}} \theta}$$

but their formulæ differ with respect to the form of the function $f(\theta)$ and the value of the numerical constant c . Macdonald's result differs again from the two just mentioned, and shows for practical cases a much smaller diminution of wave amplitude with distance than Nicholson's formula. Love, in the paper already mentioned, has undertaken the very laborious work of calculating one by one those terms of the original infinite series that contribute to the principal part of the value of the magnetic force at a certain distance from the oscillator. The values found by Love in this way for five distances, but for a single wave-length $\lambda = 5$ km., is in agreement with a table Macdonald published earlier,‡ where the magnetic force was calculated with the aid of his formula (4). This is the first instance where, in this matter, concordant results have been deduced, though found in a different way. Although the confirmation has been established only for five angular distances and one wave-length this agreement is of the utmost importance in connection with the difficult problem under consideration, so that, as Professor Love puts it, "the results may be accepted with great confidence."

The three formulæ (4), (5), and (6) agree in expressing the amplitude as containing an exponential factor that diminishes in a more or

* *Phil. Mag.*, xx., July, 1910, p. 172. Love, in the paper mentioned above, quotes Nicholson's formula as :

$$\frac{H}{H_1} = \sqrt{\frac{\sin \frac{1}{2} \theta}{\sin \frac{1}{2} \theta_1}} e^{23.8 \lambda^{-\frac{1}{2}} (\theta_1 - \theta)}$$

From Nicholson's paper, however, we deduce

$$\frac{H}{H_1} = \sqrt{\frac{\sin \theta}{\sin \theta_1}} e^{23.8 \lambda^{-\frac{1}{2}} (\theta_1 - \theta)}.$$

As this error has crept into some leading text-books on wireless telegraphy it may be worth mentioning it here.

† *Ann. der Physik.* 41, 191 (1913).

‡ *Proc. of the Royal Soc. of London*, Series A, 90, p. 58. (1914).

less rapid way as the distance from the sender is increased. The exponents in all three expressions have again the factor λ^{-1} , which shows that, as far as the exponential term is concerned, a longer wavelength ensures a better bending of the waves round the earth's curved surface than a shorter one. Though the exponential "damping" factors in these formulæ are by far the most important ones and principally determine the value of the wave amplitude, the factors $f(\theta)$ may be considered here separately.

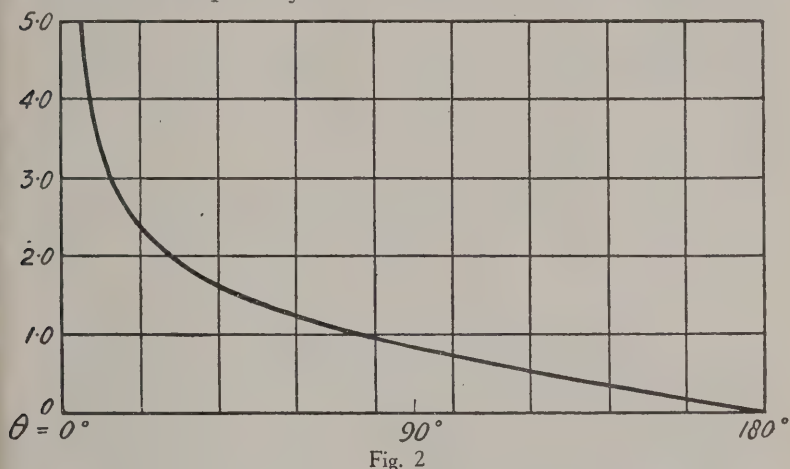


Fig. 2

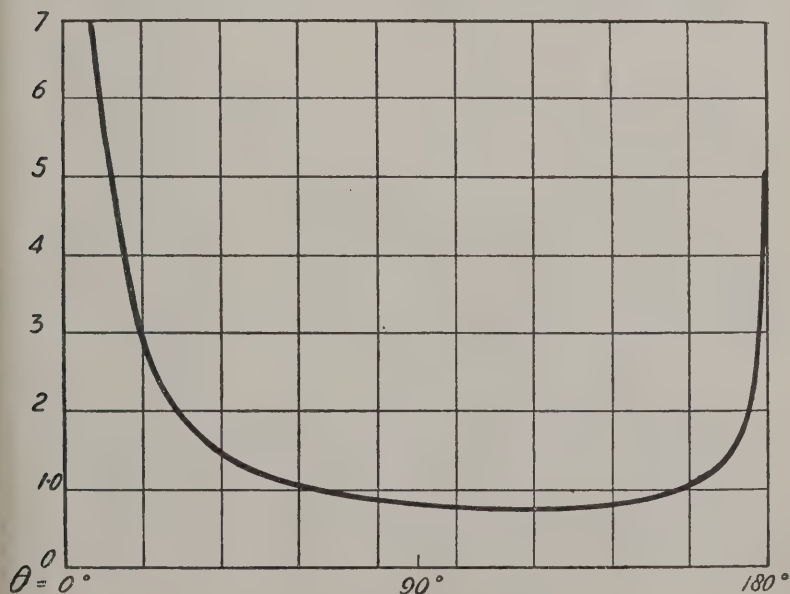


Fig. 3

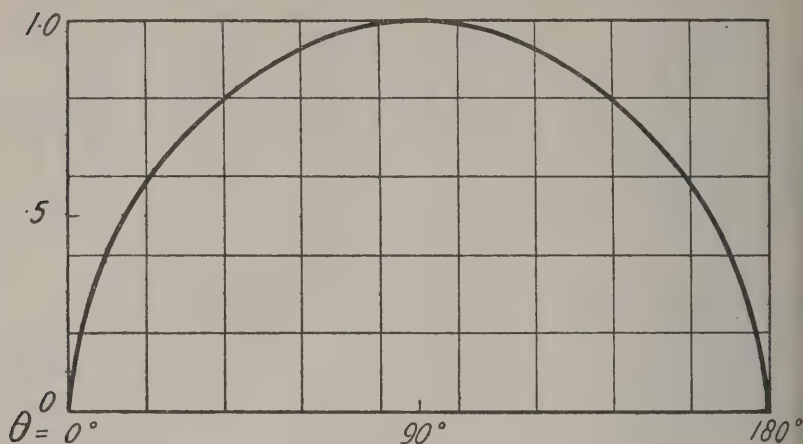


Fig. 4

Macdonald's factor $\frac{\cos \frac{1}{2} \theta}{\sqrt{\sin \frac{1}{2} \theta}}$, represented graphically in Fig. 2, and von Rybcziński's factor $\frac{1}{\sqrt{\theta \sin \theta}}$ (see Fig. 3) both diminish as the distance is increased up to $\theta=110^\circ$, and the first one goes on decreasing up to $\theta=180^\circ$. The factor $\sqrt{\sin \theta}$ (Fig. 4) in (5), on the other hand, increases to $\theta=90^\circ$ and decreases afterwards. The exponential factor $e^{-\frac{23.8}{\lambda} \theta}$ in the same expression, however, decreases so rapidly that the wave amplitude goes on decreasing from a distance very near $\theta=0$ to $\theta=180^\circ$.

It follows from the analysis of von Rybcziński and of Nicholson that their formulæ cannot be applied for the regions near the points $\theta=0$ and $\theta=180^\circ$, the approximation used by them for the zonal harmonics not being valid for these regions. The tendency of H_o , therefore, in the expression (5) to reach a zero value at the antipode of the sender is no more real than the infinity at this point suggested by (6). Both Sommerfeld * and Zenneck † point out, however, that a more or less concentration of energy near the antipode of the sender is in agreement with the physical nature of the phenomenon, the former even compares the antipode of the sender with a focus (see Fig. 3) in the theory of optics. Professor Love's criticism on von Rybcziński's work is principally concerned with this special point, and he shows that the infinity of the magnetic force at $\theta=180^\circ$ as suggested by (6) has been introduced by von Rybcziński's analysis, and he is of opinion that no such accumulation of energy at the sender's antipode can be expected. No separate investigation, however, into the value of the wave amplitude at the antipode of the sender seems to have been carried out.

* See paper cited.

† *Lehrb. der drahtl. Telegr.* (1915).

From the difference in form of the formulæ (4), (5), and (6) it cannot be concluded that they are not in agreement, each being an approximation, the one from a series, the other from an integral. One way, therefore, to compare them is to calculate with the aid of these formulæ the value of the magnetic force for wave-lengths and distances for which they have been derived and then to compare the numerical results they yield. In Fig. 5 this has been done for the wave-length $\lambda=5$ km., and in Fig. 6 for $\lambda=10$ km.

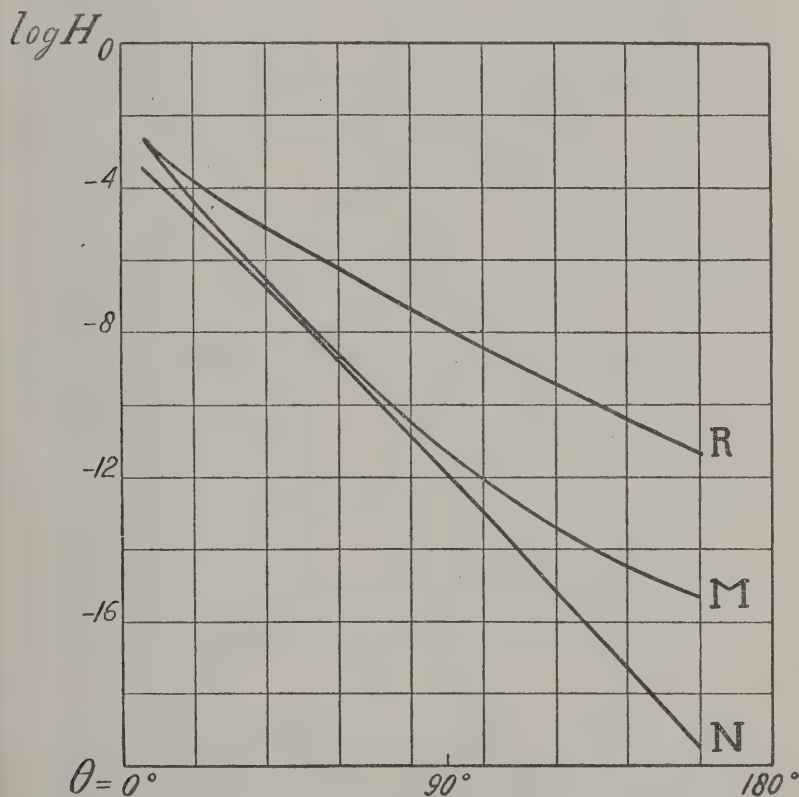


Fig. 5

The abscissæ in both figures represent the angular distance from the sender, the ordinates giving the logarithm of the amplitude of the magnetic force (due to a vibrating doublet of unit moment) to be expected according to the formulæ (4) (Curve *M*), (5) (Curve *N*), and (6) (Curve *R*) respectively. As the constant occurring in (6) is not given in von Rybczyński's paper it has been assumed to have the value that makes the wave amplitude at 6° equal to that found with the aid of the Macdonald formula. From these curves it follows that for the wave-lengths considered formula (6) (*R*) yields the greatest, (5) (*N*) the smallest values of the wave amplitude, while (4) (*M*) remains

between the other ones. When it is borne in mind that the curves give the logarithm of the amplitude to be expected, the big discrepancy between the values found with the aid of these formulæ is evident.

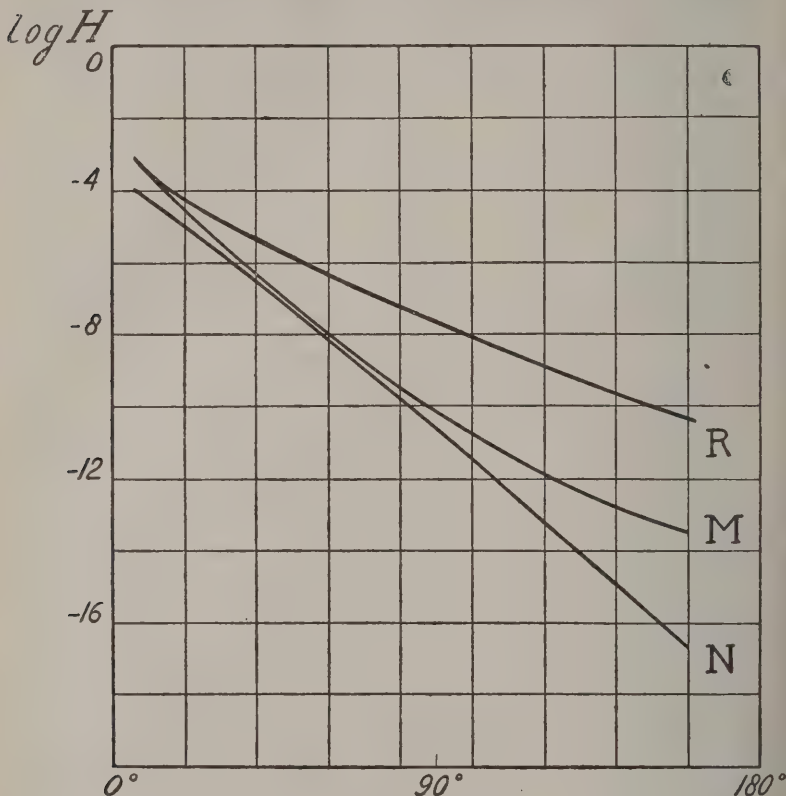


Fig. 6

In the theories just considered the earth has been treated as a sphere consisting of an infinitely good conducting material. A closer approximation to the circumstances as found in actual practice of wireless telegraphy has been obtained by solving the same problem for a sphere of finite conductivity. Von Rybcziński, in the paper mentioned already, finds that the finite conductivity only affects the first term in his formula, but has as a first approximation no influence on the exponential term. He shows, however, that, although the wave amplitude is greater than for an infinitely conducting sphere, no appreciable increase of it is obtained for such a conductivity as that of sea water. Love, who calculates the effect of a conductivity $\sigma = 10^{-11}$ in the way referred to already above, also finds an increase of amplitude, and Macdonald, treating the same problem in a recent paper* in a more general way, confirms to a certain extent Love's

* *Proc. Royal Soc.*, 92, 493 (1916).

results. He finds this increase the greater the longer the distance considered and the smaller the wave-length used. So, for instance, for a wave of 2 km. length travelling over sea water and an angular distance of 36° , which is equivalent to 4,000 km. measured over the earth's surface, the amplitude is found to be 1.186 of the value that would be obtained if the earth was a perfect conductor. For a wave-length of $\lambda=5$ km. and the same distance the factor is only 1.061.

Von Rybcziński, Love, and Macdonald all agree that the influence of a conductivity such as that of sea water, though favourable, is very small, only adding a small percentage to the wave amplitude for the case of infinite conductivity.

It has more than once been doubted if for such high frequencies as used in wireless telegraphy the value of the conductivity of different materials would be equal to that found by measurements with low frequencies or with direct currents, which formed the basis of the numerical interpretation of the theories described above. So, for instance, Professor Fleming found the conductivity of dry slate for a frequency 2.5×10^6 fifty times as great as for a frequency 920.

The present author, therefore, made a series of experiments to investigate the conductivity of sea water for different frequencies. I found for a certain sample of sea water from Hastings a conductivity for the very low frequency of 90 cycles per second of $0.377 \Omega^{-1}$ per centimetre cube (temperature $=12.5^\circ$), corresponding to $\sigma=3.77 \times 10^{-11}$. The same sample being measured with frequencies corresponding to wave-lengths $\lambda=3,400, 1,870, 1,070$ and 600 metres, values of the conductivity were obtained in very close agreement with the one mentioned above, so that it may be assumed that down to wave-lengths of 600 metres the conductivity of sea water does not vary with the frequency. No appreciable error is, therefore, made in applying the value of the conductivity of sea water for direct currents to the theories of transmission of electric waves. As the value found with direct or low frequency alternating current varies with temperature and with the geographical position of the sea from which the sample is taken, a sufficient degree of approximation will be obtained by using in theoretical investigations a value for σ between 1 to 5×10^{-11} .

When, now, the well-known measurements of received antenna currents at different wave-lengths and distances by Austin, Hogan, and others are compared with the currents that would be expected according to the theories expounded above (with the assumption that these currents are proportional to the magnetic force set up at the receiving spot), we find that they fall off with distance at a lower rate than even (6) (R) would lead us to expect. This is especially the case for the measurements made during nighttime. Austin, together with Cohen, partially guided by known theoretical results condensed his observations during daytime into an empirical law, and gave this the form :

$$I_2 = 4.25 \frac{I_1 h_1 h_2}{\lambda r} e^{-\frac{0.0015}{\lambda^{\frac{1}{2}}} r}$$

where I_2, I_1 , are the received and sending currents respectively, h_1, h_2 , the height of sending and receiving antennæ, and r the distance measured along a great circle over the earth's surface. The total antenna resistance at the receiving side is assumed to be 25Ω , and all lengths are measured in kilometres.

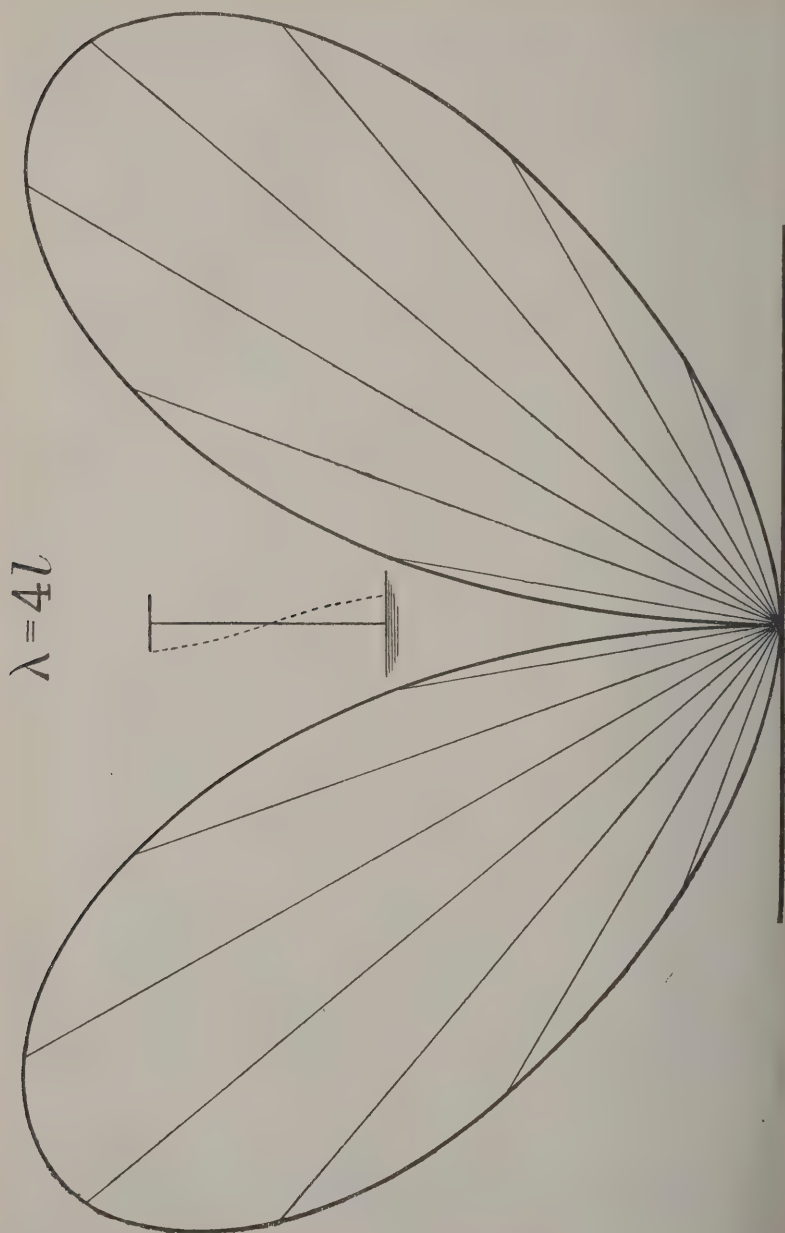


Fig. 7

In order to explain this apparent discrepancy between theory and experiment, a consideration of the reflective and refractive action of the ionised higher layers of the atmosphere has been introduced. Certain calculations by Eccles * show that an increased velocity of wave propagation can be expected when electric waves of dimension as used in wireless telegraphy travel through a medium containing free ions. When, therefore, an increase of number of ions per centimetre cube with height is assumed to exist in the atmosphere a wave-front will have the tendency to fall over in the direction of propagation, which, as a consequence, would assist the waves in bending round the curved earth's surface so that a better transmission and a bigger received current would present themselves than without this action of the atmosphere.

The knowledge, however, of the ionisation of the atmosphere up to heights between 50 and 200 km., where the densest ionisation is expected, is very incomplete. More information about this important matter may possibly be obtained by exciting an antenna in such a way that the main part of the radiated energy is directed in an upward direction. As shown by the author,† this condition may be secured if a current distribution over a vertical antenna is obtained with a current node half-way up the vertical part. The distribution of radiation in this case will be as drawn in Fig. 7, where the wave-length is assumed to be four times the total antenna height which, according to theory, can be obtained by means of certain loads at the bottom and top of the aerial. By interference of the action of the upper and lower half of the antenna no appreciable radiation can be expected in any horizontal direction. If, therefore, the reflective power of the upper layers of the atmosphere is considerable (as suggested by many writers), the current in a receiving aerial would, to a certain extent, increase with the distance from the sending station. The distance where a first maximum of the received current would be obtained would then enable us to calculate the height of the so-called Heaviside layer with a fair degree of approximation.

As the measurement of received antenna currents presents considerable experimental difficulties, especially in the calibration of the instruments to be used, so that by some writers the well-known shunted telephone method, though often employed in these investigations, is considered as quite unsuitable and unreliable, great care must be taken in comparing the experimental results with the values predicted by theory. Moreover, up to the present time the number of reliable measurements of received antenna currents is rather small.

On the other hand, a final agreement in connection with the theoretical side of the problem has not been reached yet, as was pointed out above.

In order, therefore, to eliminate the still apparent discrepancy between the electromagnetic theory of the bending of the waves round the earth's surface, based on the Maxwellian equations, and the actually measured values of received antenna currents, first a theoretical agreement has to be reached, and, secondly, a good deal more of

* *Proc. Royal Soc.*, Series A, vol. 87, 79 (1912).

† *Proc. Phys. Soc. of London*, xxix., 269 (1917).

very careful measurements are necessary. These measurements could preferably be carried out with undamped waves, for which all theories have been designed, eliminating in this way two quantities—namely, logarithmic decrement and number of discharges per second, both of which partially determine the current set up in a receiving antenna.

It has more than once been pointed out by several physicists that until further information on these points is at hand no definite conclusion about the validity of the electromagnetic theory can be drawn, and it seems, therefore, that the moment has not yet arrived to look out for other agents and to use phenomena, such as anomalous dispersion, interference bands, etc., in order to explain the propagation of electric waves over the earth's surface, though the important differences between night and day reception undoubtedly point to an influence not to be neglected of the atmosphere on the propagation of the waves of wireless telegraphy.

WIRELESS TELEGRAPHY IN THE U.S.A.

HOW IT HAS BEEN AFFECTED BY AMERICA'S ENTRANCE INTO THE WORLD'S WAR.

By DAVID SARNOFF,

Secretary, Institute of Radio Engineers.

WHILE a declaration of war naturally affects, in a material way, the industries of a nation, yet it is questionable whether any enterprise in the United States has undergone so complete a change as wireless in so brief a period with less friction, lost motion, waste, uneconomical production, and many other evils which attend a hasty transformation.

National pride and intimate connection with the radio art may incline the writer to a most generous survey of the results thus far achieved, but no lesser claim than a signal victory is due the wireless workers in the United States.

The wireless men in America realise that the task is far from finished, and that much remains to be accomplished before the end for which the allied nations are putting forth their best efforts is attained; but I am confident that when the achievements of mankind in this bitter struggle shall have been chronicled the contributions of the wireless men will be found near the top.

The satisfactory results of which I speak are due in a large measure to the wisdom, fairness, and efficiency of those who administer the affairs of the United States Government, and charged with the responsibility of providing wireless equipment, personnel, and communication for the nation's use in the present crisis. The capabilities exhibited by the Government's officers directly charged with these responsibilities have produced a feeling of confidence in the minds of American manufacturers of wireless equipment and managers of radio communication companies, and this has resulted in complete harmony between the Government Administration and private concerns—a harmony best expressed by that embracing word "co-operation." In justice to the wireless companies and the manufacturers of apparatus in this country let it be said that their prompt response to the nation's need is a record of which every radio man may well be proud.

To help the reader visualise the situation I will indicate specifically some of the problems which existed at the time war was declared by the United States.

The limited American merchant marine which this country had prior to the war, the bitter struggles between the various commercial wireless interests—spending much of their time, effort, and money in patent litigation for the protection of what they contended to be

their individual patent rights—the pending Congressional legislation, which proposed Government ownership of radio land stations: all served to stifle the growth and development of the radio art and limited the facilities for speedy production of large quantities of wireless equipment. It reduced, proportionately, the number of trained experts and other personnel which would otherwise have been available for immediate service.

In explanation of these limited facilities it should be said that heretofore the efforts of wireless interests in America were more or less confined to United States territory, while our European friends gave considerable attention to the needs of countries other than their own, which naturally resulted in their greater output and the consequent more extensive facilities. All this can perhaps best be summed up by saying “we were not prepared.”

The pressing needs of the hour, briefly, were: To provide facilities for the manufacture of the required radio equipment for the large number of vessels built and commanded by the United States Shipping Board and the United States Navy Department; a constant supply of licensed wireless operators for service on the rapidly increasing merchant marine; trained men to instal the radio apparatus on the vessels, and engineers capable of coping with the many problems of wireless communication and production. Obviously, such a programme of necessities permitted of no individual strife, no unproductive labour; instead it called for concentration, action, and unity.

I have indicated that the response of the wireless companies and their men was “in tune” with the requirements, and this response has resulted in the building of new factories, extension of other facilities, and the production of large quantities of complete equipments in time to meet the needs of the Army, the Navy, and the Shipping Board programmes.

As wireless offered an opportunity for immediate and direct service in the Army or Navy, it appealed strongly to the young men of this country who wished to fit themselves for national service. To meet the situation a large number of schools were established throughout the United States where wireless telegraphy is taught to those who wish to learn. Intensive training at such schools has provided the necessary radio operators for our Government.

Under the President's proclamation the U.S. Navy Department has full jurisdiction over the operation of all land stations within the territory of the United States, and, as most of the commercial stations were owned and operated by the Marconi Company prior to the war, that company, immediately on the declaration of war, offered to the United States Government all of its stations, facilities, and personnel. The acceptance of this offer accounts for a very large number of Marconi employees now enlisted in the service of the Government.

The activities of other radio companies, because they did not have a chain of coast stations and a large staff of trained men, have been directed more especially along manufacturing lines, which, as I have previously stated, is also of vital importance in the emergency.

Present circumstances make inadvisable a detailed discussion of technical accomplishments in the radio field or the specific performances

of certain types of apparatus, but these matters will make interesting reading when the time for their recording arrives.

The effect of the war on the wireless art in the United States has been a rapid development and expansion of a comparatively limited industry to one of considerable magnitude.

Wireless telegraphy has been universally recognised as the greatest agency for the safety of life at sea. This recognition was earned long before the war, but the part wireless has played, and is destined to play during the remainder of the world conflict, will earn for it as well additional recognition of its importance as a successful agency for waging war, and we can look with even greater pride to the future when wireless will take its natural place as the most advanced medium of communication and carrier of intelligence over land and sea between the various nations and their peoples.

THE MAGNETIC BEHAVIOUR OF IRON IN ALTERNATING FIELDS OF RADIO FREQUENCY.

By DR. N. W. McLACHLAN.

SYNOPSIS.

1. INTRODUCTION.
2. THE PROPAGATION OF MAGNETISATION IN IRON.
3. THE BEHAVIOUR OF IRON UNDER ALTERNATING MAGNETISATION.
4. HYSTERESIS AND EDDY CURRENT LOSSES.
5. VARIATION IN PERMEABILITY WITH TEMPERATURE.
6. THE USE OF IRON IN HIGH-FREQUENCY APPARATUS.
7. THE EFFICIENCY OF USING IRON AT H.F. COMPARED WITH THAT AT L.F.
8. LIST OF REFERENCES.

I. INTRODUCTION.*

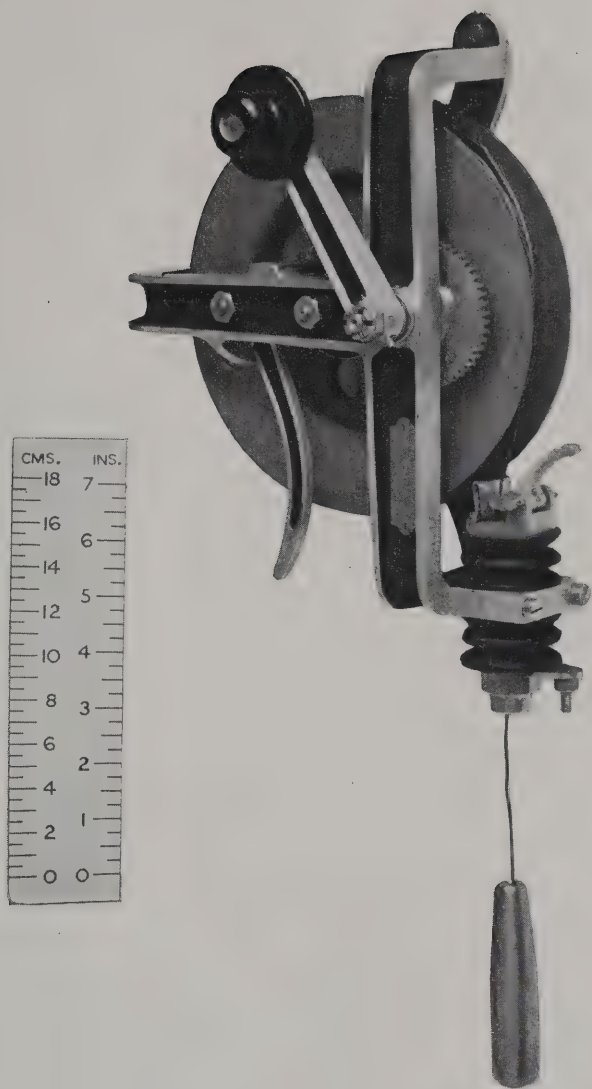
IT has been known for some time that iron is influenced by the oscillatory discharge of a condenser. In 1842 Professor Joseph Henry noticed that oscillations produced by a condenser discharge in one circuit, magnetised steel needles placed in a solenoid or inductance coil connected in another closed circuit, even when the circuits were some distance apart. Sometimes the iron was left magnetised in one direction, and at other times in the opposite direction—*i.e.*, one end of the steel needle was either a north or a south pole. This seemed to show that iron responded to the magnetising forces caused by high-frequency oscillations. Much experimental work has been done in recent years on the magnetic behaviour of iron and other magnetic substances—*e.g.*, nickel, under the influence of the oscillatory discharge of a condenser.²² It is now generally recognised that iron responds to high-frequency magnetisation produced by damped or undamped oscillations, and that it undergoes cyclic changes and retains its magnetic properties even at frequencies of several millions per second.

2. THE PROPAGATION OF MAGNETISATION IN IRON.^{38, 39}

The circuit shown in Fig. 1 consists of a large non-inductive resistance, a battery of accumulators, an ammeter, a switch for making, breaking, or reversing the current, and a large electromagnet (solid core), which is essentially a solenoid with an iron or steel core. Search coils having equal numbers of turns are situated at different depths in the iron and enclose equal areas (see Fig. 2).

The terminals of each of the three search coils can be connected to an oscillograph or some form of dead beat reflecting voltmeter, so that the e.m.f. caused by an alteration in the flux through the magnet core is recorded on a photographic film moving at uniform speed.

* The numbers throughout the text refer to the Authors whose names will be found in the list of references at the end of the Paper.



AERIAL WINDING-GEAR FOR AIRCRAFT USE.

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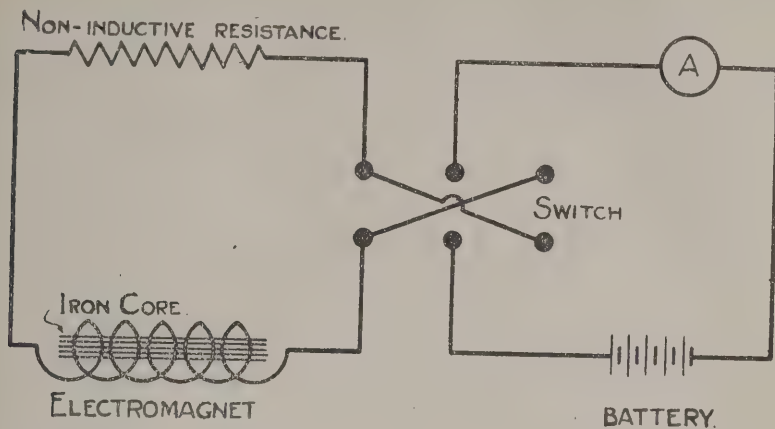


Fig. 1. Apparatus used for experiments on the Propagation of Magnetisation in Iron.
The Oscillograph connections have been omitted.

SHADED PORTIONS INDICATE
POSITIONS OF SEARCH COILS.

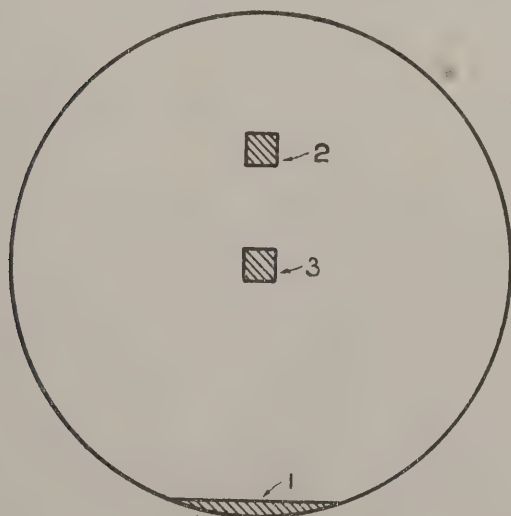


Fig. 2. Diagram showing positions of three search coils in core of electromagnet.

If the time constant * of the circuit is small, the current will attain a steady value almost immediately after the circuit is made. Provided the flux throughout the mass of iron kept step with, and was pro-

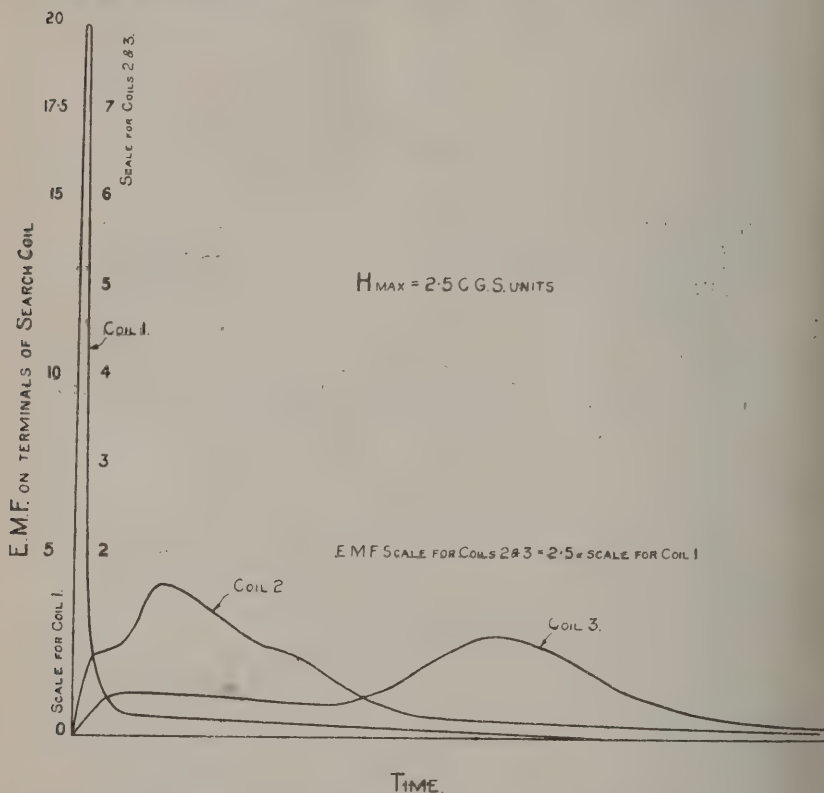


Fig. 3. Diagram showing e.m.f.'s on search coils in core of electromagnet.

portional to, the magnetising force at the surface (*i.e.*, there was no lag of the flux behind the magnetising force), the e.m.f.'s at the terminals

* The function of the non-inductive resistance is to reduce the time constant of the circuit—viz., L/R , where L =self-inductance (which in this case is variable owing to the presence of iron), and R =total resistance of circuit. When L is constant, the current, at any instant after switching on, is given by the well-known formula

$= I_0(1 - e^{-\frac{Rt}{L}})$, I_0 being the largest value of the current, and t the time. The current approaches the value I_0 asymptotically, but by making R/L large (or L/R small), i is practically equal to I_0 just after the circuit is made. As stated above, L is variable when the solenoid is iron cored,³⁵ and no mathematical expression can be obtained showing the relation between current and time. It is clear, however, from the formula that the larger R , the shorter the time taken for the current to attain a steady value.

of each of the three search coils would be equal, and would depend at any instant on the rate of change of current di/dt . Since the current rises quickly, and then gradually approaches a steady value, the e.m.f.'s on the coils will also rise quickly, reaching a maximum value, and then die away more slowly. The phenomenon will be of a transient nature.

It is found, however, that the e.m.f.'s on the three search coils are not proportional to the rate of change of current or magnetising force. Also, the e.m.f.'s are not of equal magnitude at corresponding times—i.e., they lag relative to each other. The curves in Fig. 3 show the relation between e.m.f. and time for a value of the maximum magnetising force $H_{max}=2.5$ c.g.s. units.³⁸ It will be seen that the maximum e.m.f. in coil 1 is much greater than that in either coils 2 or 3. If the area of one of these curves is found, the value at any instant represents the corresponding value of the flux within the search coil, since $e = k dN/dt$, and therefore $N = \int e dt$, where N = flux in coil, e = e.m.f. on terminals, and t = time. Since the total flux change is the same for each coil the areas of the three e.m.f. curves are equal. The relation between flux and time is shown by the curves in Fig. 4, which were obtained by

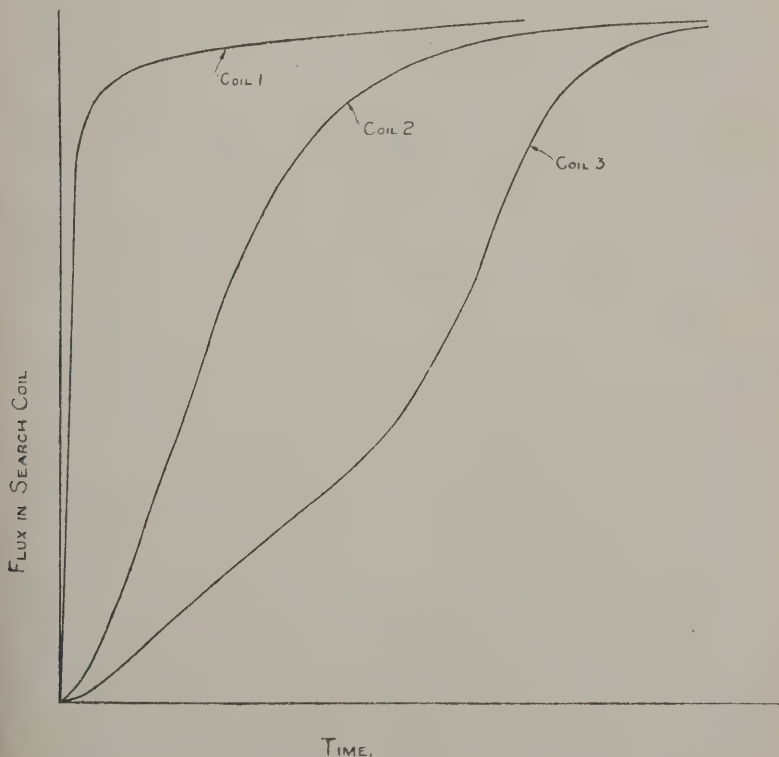


Fig. 4. Diagram showing flux in search coils in core of electromagnet.

integrating the curves in Fig. 3. The flux rises rapidly in coil 1, but less rapidly in coils 2 and 3. This is due to the magnetising forces within the iron at coils 2 and 3 being smaller than that at the surface of the core where coil 1 is situated.

When the magnetic flux within a body changes, an e.m.f. is induced in the body, which causes a current to flow. Moreover, if the current through the winding of the electromagnet is altered, there is a corresponding change in the flux through the core. The flux cutting the mass of iron, causes local currents to flow therein, these giving rise to magnetic fields. If the cross-section of the core is circular, it may be imagined to consist of an infinite number of short circuited annular secondary coils of one turn each; or of an infinite number of solenoids of one turn each. The current through the secondary or the solenoid depends on the distance from the surface and on the rate of change of flux. The magnetising forces caused by these local or eddy currents affect the iron within the annuli,* and will, according to the laws of electromagnetic induction, oppose the magnetising force causing the change of flux—i.e., the magnetising force caused by the current in the winding of the electromagnet. Hence the net or resultant magnetising force at any point within the iron is the algebraic sum of the main magnetising force and that produced by the eddy currents. It is clearly least at the centre of the core where the effect of eddy currents is greatest.

Thus the magnetisation in the core at coils 2 and 3 is less than that at coil 1, due to the eddy currents produced by the changing flux. The eddy currents, however, gradually die away, owing to the damping effect caused by the resistance of the iron, until finally the flux attains the same value at all points in the cross-section of the core. (See Fig. 4.) This is equivalent to saying that a flux wave travels from the surface of the core to the centre. The velocity of propagation is variable throughout the mass owing to the variation in permeability with the magnetising force.³⁸

The flux wave, therefore, travels from the surface inwards with finite velocity, and an interval of time, t_1 suppose, elapses between the reversal of the current through the winding and the instant the flux attains its largest value at the centre of the core. The smaller the diameter of the core, or if it consists of a rectangular block, the less the thickness, the shorter the time t_1 . If the current is again reversed before the time t_1 has elapsed, the flux does not attain its largest value at the centre of the core. The first flux wave is neutralised by another wave of opposite sign. Thus the smaller the time which elapses between successive reversals of the current, the smaller the flux at the centre of the core.

If an alternating current of suitable frequency (not necessarily more than a few periods per second) is passed through the field winding, the greater portion of the flux will be confined to annuli near the surface of the core. A thin wire or plate magnetised by an undamped high-frequency current of, say, 2×10^5 periods per second, is somewhat similar to the large iron core magnetised at low frequencies. The flux would not have time to attain its largest value everywhere within the iron before the current had reversed. It has already been shown that

* The current within an annulus has no effect on the material outside it.

the flux within the iron is not in phase with the magnetising force at the surface, the amount of lag depending (among other things) on the distance from the surface. This condition also holds for a thin plate or wire under high-frequency magnetisation, and the phase difference between the flux at the surface and that in the iron depends on the frequency.

On the assumptions that there is no hysteresis and that the permeability of the iron is constant, the propagation of magnetisation in a n iron plate can be treated mathematically.^{34,27} The current in the magnetising coil is taken to be sinusoidal. The curve in Fig. 5 gives some idea of the distribution of flux within the iron, when the flux

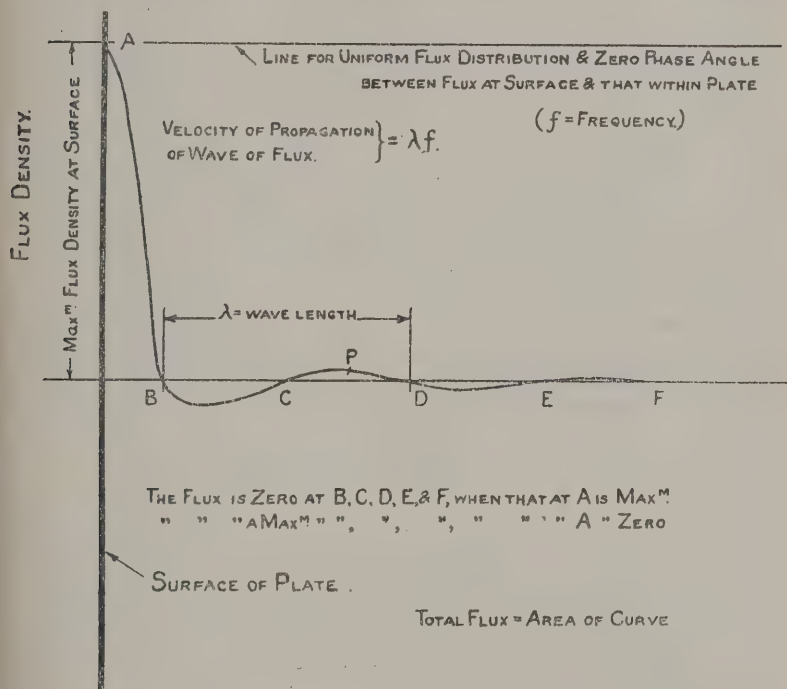


Fig. 5. Diagram showing distribution of flux in an iron plate when magnetised at high frequency. The flux at the surface is a maximum.

density at the surface is a maximum. The flux density at any point oscillates according to the same law as the magnetising current, but there is a phase difference between the maxima values of the flux at different points within the iron and the flux at the surface. This is due to the velocity with which the flux wave travels inwards from the surface, being small compared with the frequency of the current. The flux wave is damped as shown in Fig. 5. The distance between alternate zero values is the wave-length, and the phase difference between the flux at these points is 360° . The wave-length is given by the formula $\lambda = (\rho/\mu f)^{1/2}$, where λ =wave-length, ρ =specific resistance,

μ =permeability, and f =frequency. Since the velocity of propagation of a wave is the product of wave-length and frequency,

$$V = \lambda f = \left(\frac{\rho f}{\mu} \right)^{\frac{1}{2}},$$

and increases with the frequency. Taking the wave-length for a silicon iron (Stalloy) plate 0.025 cm. thick as 0.01 cm. at a frequency of 2×10^5 periods per second, the velocity of propagation of the flux wave would be 2,000 cm. per second—*i.e.*, the wave would reach a depth of 0.01 cm. in $\frac{1}{2 \times 10^5}$ second.

When the phase angle between the flux at the surface and that within the plate exceeds the phase angle at B in Fig. 5, the flux half a wave-length beyond B —*i.e.*, between B and C —is in a different direction from that between B and the surface. Also the flux between C and D is in the same direction as the surface flux, and so on every half wave-length. Hence the eddy currents at high frequencies not only prevent the flux attaining its largest value throughout the plate but cause it to be reversed, thus producing a further diminution in the total flux. This is illustrated in Fig. 5, where the area beneath the horizontal line represents the total flux at low frequencies, and the algebraic sum of the areas of the portions of the curve represents the flux at high frequencies.* It follows, therefore, that at high frequencies the interior of a plate or wire is useless as a flux-carrying medium.

If there were no eddy currents in the iron and the flux everywhere within the iron was in phase with that at the surface, the flux density would be uniform throughout the cross-section. Suppose the total flux within a plate, under these conditions, is $N_1 = B_1 A$, where B_1 = uniform flux density, and A = cross-sectional area; and in the actual case when the flux density is not uniform, suppose $N_2 = B_2 A$. Then $\frac{N_2}{N_1} = \frac{B_2}{B_1}$ (*i.e.*, the ratio of the fluxes or flux densities) = γ , say. The product of γ and half the thickness of the plate—*i.e.*, γa , gives the "equivalent depth of uniform magnetisation." This means that if the magnetisation was uniform for a depth, γa , on each side of the plate, the flux density being B_1 , the total flux in the plate would be $N_2 = B_2 A$.

The equivalent depth of uniform magnetisation can be calculated mathematically, using the assumptions given above. At high frequencies, when the plates are not too thin^{27, 34}

$$d = \frac{1}{2\pi} (\rho/2 \mu f)^{\frac{1}{2}},$$

where d is the equivalent depth, the other symbols having the same meaning as before.

For a given frequency and magnetising force, the eddy currents will be lessened by increasing the specific resistance of the iron, but augmented by increasing the permeability owing to the higher flux

* The total flux within the iron at any instant is the algebraic sum of the product of area and flux density throughout the thickness. If dN = flux in area dA , then the flux density B in the area dA is $\frac{dN}{dA}$: thus $BdA = dN$, and for the whole plate $\int BdA = \int dN = N$, where N is the net flux.

density. Thus the equivalent depth will be increased in the first case but decreased in the second.

The calculated and experimental values of the equivalent depth agree closely for thick plates (2 or 3 mm.) at low frequencies, and thin plates (0.25 mm. to 0.5 mm.) at moderate frequencies of, say, 1,000 periods per second. With thin plates at radio-frequencies there is, however, a large discrepancy between theory and practice. The equivalent depth, at radio-frequencies, does not vary with specific resistance, permeability, and frequency, according to the same laws as the formula indicates. According to the formula, the equivalent depth is independent of the thickness of the iron. In practice it is found that for a given frequency, the thinner the iron the greater the equivalent depth. The alteration in the equivalent depth with frequency, thickness, and specific resistance is illustrated by the data in Table 1, and the discrepancy between experiment and calculation is shown by taking the ratio of the two values. As a deduction from Table 1, it may be stated that with a plate of silicon iron 0.25 mm. thick the equivalent uniformly magnetised area is 4 per cent., whilst with a pure iron plate of equal thickness it is only 1.6 per cent., the frequency in each case being 2×10^5 periods per second. In other words, 96 per cent. and 98.4 per cent. respectively of the cross-sectional areas of the iron are useless as flux-carrying media. This clearly shows the necessity for using very thin plates to secure as large a flux as possible for a given magnetising force and a definite cross-sectional area of iron.

TABLE 1.—Showing the effect of frequency, thickness, and specific resistance on the Equivalent Depth of Uniform Magnetisation.

$$H_{max.} = 4 \text{ c.g.s. units.}$$

Frequency ~ per sec.	Thickness of iron mm.	Equivalent depth mm.		Ratio. ^a	Material.
		Calculated.	Experimental.		
2×10^5	0.25	0.011	0.005	0.45	{ Silicon iron $\rho = 54.5 \times 10^{-8}$ ohm per cm. cube
5×10^5	0.25	0.0072	0.0028	0.4	
2×10^5	0.47	0.011	0.004	0.36	
2×10^5	0.25	0.0054	0.002	0.37	{ Pure iron $\rho = 12.5 \times 10^{-8}$ ohm per cm. cube

3. BEHAVIOUR OF IRON UNDER ALTERNATING MAGNETISATION.

When iron in the form of thin sheets insulated from each other is magnetised by an alternating current of low frequency, say 50 periods per second, the chief phenomena which occur are : (1) The flux in the iron undergoes cyclic changes, the periodicity being the same as that of the magnetising current ; (2) the flux is out of phase with the current owing chiefly to magnetic hysteresis—*e.g.*, when the current is zero the flux has either a positive or a negative value ; (3) the alternating flux causes eddy currents in the iron sheets, as has been shown in the preceding section.

The shape of the flux wave depends on that of the current wave. If the waves of current and e.m.f. are obtained by means of an oscillograph, the flux wave can be deduced from the e.m.f. wave, for $N = kfedt$, where N = total flux in iron, e = e.m.f. on terminals of search coil wound over the iron to determine the e.m.f. wave, t = time, and k is a constant depending on the frequency, the number of turns on, and the area of the search coil. Thus, knowing the shapes of the flux and current waves and their relative displacements on the time axis, the ratio $B/H = \frac{\text{flux density}}{\text{magnetising force}}$ at any instant can be determined.

Under static magnetisation the ratio B/H is termed the permeability.¹⁰ When the magnetisation is caused by an alternating current, this ratio cannot be viewed in exactly the same way, owing to the different conditions in the two cases, although the numerical values may agree closely. If the ratio B/H is found for various values of the current, in the manner indicated above, it is not equal to that under static magnetisation. This is due to the displacement of the flux wave caused by hysteresis. The maxima values of B and H occur simultaneously,²⁰ however, when the e.m.f. and flux waves are sinusoidal, and the ratio B/H in this case agrees closely with that found under static magnetisation.* With a sinusoidal flux wave the current is approximately sinusoidal at low flux density—i.e., on the initial portion of the B — H curve, but, as the flux density increases, higher harmonics appear in the current wave owing to the relation between B and H not being a linear one. Since the flux is sinusoidal, the eddy currents in the iron follow the same law and have the same frequency as the flux.

When the *magnetising current* is sinusoidal, the e.m.f. wave is peaked; the form factor and the ratio B_{\max}/H_{\max} are greater than the values obtained when the e.m.f. and flux waves are sinusoidal.^{20, 23} The flux wave corresponding to a sine wave of current is approximately sinusoidal at low flux density, but becomes more rectangular in shape as the flux density increases, the maximum value thereof²⁰ occurring before the maximum value of the magnetising current.† The Fourier analysis of such a wave shows the existence of higher harmonics. These harmonics cause eddy currents of corresponding frequencies. It is probable that these eddy currents influence the iron in a similar manner to that of high-frequency oscillations, thereby causing an increase in the ratio B_{\max}/H_{\max} . As the frequency increases, however, a value is reached when the screening effect of the eddy currents neutralises the effect causing increase in B_{\max}/H_{\max} . Between this and zero frequency there is some value of the frequency for which the ratio B_{\max}/H_{\max} is a maximum (for a given value of H_{\max}).

* The method generally adopted in determining B_{\max} is to find the form factor of the e.m.f. wave (1.11 if wave is sinusoidal), and apply the formula $E = 4fm B_{\max} Afn \times 10^{-8}$ volts, where E = e.m.f. on search coil, A = area of iron within search coil, n = turns on search coil, fm = form factor of e.m.f. wave = $\frac{\text{R.M.S. value}}{\text{mean value}}$. H_{\max} is calculated from the current and the constants of the field winding.

† This may be due to the fact that the effect of superposed oscillations is greater with small than with large magnetising forces.

It has been shown above that at high frequencies the flux density is not uniform throughout the cross-section of iron. Thus the value of the maximum flux density B_{max} obtained from the ratio $\frac{\text{total flux}}{\text{cross-sectional area of iron}}$ is only an average or "apparent" value. Moreover, the ratio $\frac{B_{max}}{H_{max}}$ under these circumstances may be taken to

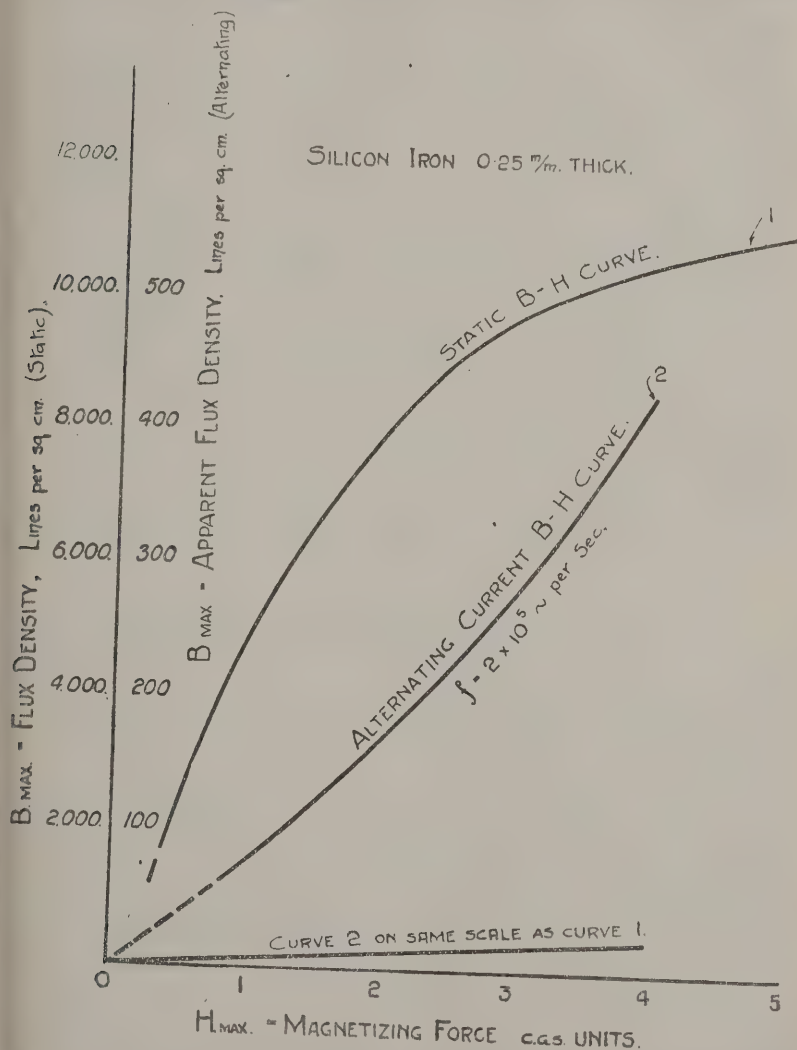


Fig. 6. B—H curves for Stalloy (silicon iron) under static and alternating magnetising forces.

represent the *apparent permeability* μ_a . It is evident that the value of μ_a for a given value of H_{max} depends on the frequency.^{1, 25} Curves illustrating the apparent permeability of 0.25 mm. silicon iron sheets at a frequency of 2×10^5 periods per second, and the permeability under static magnetisation (which is approximately equal to that at a frequency of 50 periods per second) are shown in Fig. 6. The reduction in the flux in a plate, and therefore the apparent permeability, caused by the screening effect of eddy currents is clearly exhibited by these curves.

The absence of oscillograms of e.m.f. and current, prevents a detailed analysis of the phenomena accompanying the magnetisation of iron at radio-frequencies being made. No definite statement can be made, therefore, concerning the influence of the wave shape of the magnetising current or e.m.f. on the ratio $\frac{B_{max}}{H_{max}}$, or on the behaviour of the iron in general.

On the assumptions that there is no hysteresis, and that the permeability of the iron is constant, the formulæ obtained, by mathematical analysis, for the maximum apparent flux density B_{max} and the apparent permeability at high frequency are³⁴:

$$B_{max} = \frac{B_s}{2\pi a} \left(\frac{\rho}{2\mu f} \right)^{\frac{1}{2}} = B_s \times \frac{\text{equivalent depth}}{\text{semi-thickness}} \quad (1)$$

$$= \frac{H_{max}}{2\pi a} \left(\frac{\mu \rho}{2f} \right)^{\frac{1}{2}} \quad \text{since } \mu = \frac{B_s}{H_{max}}$$

$$\text{and } \mu_a = \frac{B_{max}}{H_{max}} = \frac{1}{2\pi a} \left(\frac{\mu \rho}{2f} \right)^{\frac{1}{2}} = \mu \times \frac{\text{equivalent depth}}{\text{semi-thickness}} \quad (2)$$

where

B_{max} = maximum apparent flux density.

H_{max} = maximum magnetising force, alternating or static.

B_s = flux density under static magnetisation.

μ = permeability under static magnetisation.

μ_a = apparent permeability under alternating magnetisation.

a = semi-thickness of iron plate.

(The thickness of the plate must be small compared with the other dimensions, since, in theory, the plate is assumed to be infinite in extent.)

The values of B_{max} and μ_a , calculated from formulæ 1 and 2, are always larger than the values obtained experimentally.^{6, 16} The difference between theory and practice increases with the thickness of the plates. This can be seen from the data in Table 1. If, however, the specific inductive capacity of the metal is included in the equations for the propagation of magnetisation, the formulæ for B_{max} and μ_a are modified, such that by assuming large values for the specific inductive capacity,^{6, 16} experiment and calculation are in agreement.* These large values, which decrease with increase in frequency, may be caused by hydrogen under high pressure occluded within the metal. Although the specific inductive capacity of hydrogen itself, even under high

* This also applies in connection with the calculated and experimental values of the equivalent depth of uniform magnetisation.

pressure, is smaller than the values necessitated by the formula, the above case may be similar to that in which the dielectric contains conducting particles. In this case the specific inductive capacity is much greater than that for the pure substance.¹⁶

The modified formulæ * for B_{max} and μ_a , at high frequencies, are ¹⁶

$$B_{max} = \frac{B_s}{2\pi af(\bar{k}\mu)^{\frac{1}{2}}} = B_s \times \frac{\text{Equivalent Depth}}{\text{Semi-Thickness}} \quad (3)$$

$$= \frac{H_{max}}{2\pi af} \left(\frac{\mu}{\bar{k}}\right)^{\frac{1}{2}} \quad \text{since } \mu = \frac{B_s}{H_{max}}$$

$$\text{And } \mu_a = \frac{B_{max}}{H_{max}} = \frac{1}{2\pi af} \left(\frac{\mu}{\bar{k}}\right)^{\frac{1}{2}} = \mu \times \frac{\text{Equivalent Depth}}{\text{Semi-Thickness}} \quad (4)$$

where \bar{k} = specific inductive capacity or dielectric coefficient.

Although formulæ (3) and (4) yield results which agree more closely with experiment (the value of \bar{k} being assumed) than those obtained with formulæ (1) and (2), it must be remembered that the permeability of the iron cannot be constant owing to the variation in magnetising force. This might partly explain the discrepancies between theory and practice, for it would entail a reduction in the total flux in a plate, and therefore a reduction in B_{max} and μ_a (for a given value of H_{max}). There would be a difference in shape between the flux and current waves, owing to the relation between flux and current not being linear.† Also, it is possible that with cores consisting of bundles of insulated wires or sheets, the iron at the centre may be screened by that on either side. However, when the magnetisation of iron at radio frequencies is considered from the point of view of the electron theory, there does not seem to be any reason why the iron should not respond to cyclic changes, and this appears to be confirmed by experiment. When allowance has been made for disturbing factors—e.g., eddy currents—it is probable that the ratio B/H is similar, if not equal, to that at low frequencies.

Using formula (1), the apparent permeability at frequencies of a higher order than those employed in radio-telegraphy may be considered. With a plate of silicon iron (Stalloy) 0.5 mm. thick, the apparent permeability would be "unity" at a frequency of about 2×10^9 periods per second, provided the conditions assumed in deducing the formula are valid at this frequency. If the iron did not respond to magnetisation at this frequency (this is equivalent to saying that it would be non-magnetic with a permeability of unity), the apparent permeability would only be 0.02.‡ Under this latter condition the

* It is of interest to notice that under these new conditions the velocity of propagation of magnetisation is given by $V = \frac{1}{(\mu\bar{k})^{\frac{1}{2}}}$ and the wave-length $\lambda = \frac{1}{f(\mu\bar{k})^{\frac{1}{2}}}$. The velocity increases with the frequency, since \bar{k} diminishes with increase in frequency (compare with Section 2).

† If $\mu = \frac{B}{H_{max}}$ were constant, the relation between B and H_{max} , and therefore between flux and current, would be a linear one. In practice, of course, μ is not constant.

‡ In addition to variation in permeability, there is the question of the constancy of the specific resistance. There appears to be some doubt whether the specific resistance is the same at high frequencies as it is at low frequencies.

total flux in a solenoid having a core of iron plates 0.5 mm. thick would be 0.02 of that when the iron was absent—*i.e.*, with an air core. The voltage across the terminals of the solenoid, however, would be greater than that at a frequency of 50 periods per second, the current having the same value in each case.

4. HYSTERESIS AND EDDY CURRENT LOSSES.

Mention has been made of the occurrence of hysteresis and eddy currents when iron is subjected to alternating magnetisation. These cause a loss of electromagnetic energy which is dissipated in the form of heat. The energy equivalent to the heat generated within the iron must be supplied by the current in the magnetising coil. If iron could be magnetised without energy loss, the current and E.M.F. waves would be in quadrature—*i.e.*, there would be a phase difference of 90 electrical degrees, and the current and flux waves would be in phase.* Since there is an energy loss, the phase difference between the current and E.M.F. is less than 90 degrees, and that between the current and flux is not zero. Neglecting the loss in the field winding, the power required to balance the magnetisation loss is equal to Volts \times Amperes \times Power Factor. For the thickness of plate used in ordinary low-frequency transformer construction (0.5 mm.), the power factor of a coil is small at a frequency of 50 periods per second. It increases with the frequency, and at radio frequencies it is large and nearly unity.^{1 25} The data in Table 2 illustrate this point. At low frequencies, however, the power factor is nearly unity if the iron is thick enough, say 2 inches²⁶; for a thick plate in a low-frequency field is somewhat similar to a thin plate in a high-frequency field. The power factor for given frequency and magnetising force depends on the thickness of the iron, and there is a certain thickness for which the power factor, and therefore the total loss in the iron, is a maximum. This

TABLE 2.—Showing effect of frequency on power factor for given thickness, specific resistance, and magnetising force.

0.47 mm. Silicon iron. $H_{max} = 3.0$ C.G.S. units.

Frequency.	Power Factor.
	Experimental.
50	0.23
2×10^5	0.88

also holds at low frequencies, but the thicknesses in the two cases are very different. With extremely thin plates, say 0.01 mm., the chief source of loss, at high frequencies, is hysteresis, and the total loss at a given apparent flux density is much smaller than that for a thicker plate. Under these circumstances the power factor would be smaller than that for the thicker plate, and would be affected in a greater degree by variation in frequency and flux density.

* Strictly speaking it is incorrect to use the expression "phase difference," because the current and e.m.f. waves are not similar in shape. The phase difference may be taken as the angle, in electrical degrees, between corresponding zero values of current and E.M.F. on the time axis.

Theoretically, the power factor for plates about 0.25 or 0.5 mm. thick, calculated from the eddy current loss alone, is independent of the thickness, magnetising force and frequency. Its value^{3, 16, 34} should not exceed $1/\sqrt{2} = 0.707$.^{*} Thus the phase difference between the current and E.M.F. should not be less than 45° , and that between the current and flux should not be greater than 45° —i.e., when the power factor is $1/\sqrt{2}$, the current wave is midway between the flux and E.M.F. waves (assumed sinusoidal in shape). It has been shown above that in practice the power factor is not independent of thickness, magnetising force and frequency, and that its value exceeds 0.707. Apart from the effects of hysteresis and variation in permeability, the difference may be explained by introducing the specific inductive capacity of the iron into the mathematical equations (see Section 3).

At low frequencies, when the magnetisation is uniform throughout the cross-section of the iron, the total loss can be represented fairly accurately by the formula

$$W = k_1 f B_{\max}^n + \frac{k_2 f^2 a^2 B_{\max}^2}{\rho} \quad (5)$$

= Hysteresis + Eddies

Where W = watts lost per kilogram,
and n = hysteretic index, the value of which depends on the flux density, but is about 1.6 for the flux densities employed in low frequency transformers. k_1 and k_2 are constants.

This formula may hold for extremely thin plates or wires at high frequency when the magnetisation is uniform, or nearly so. It is uncertain, however, what the value of the hysteretic index may be. If iron behaves at high frequencies in the same manner as dielectrics,¹² the hysteresis will diminish, and this may cause a change in the index. As the frequency increases, the hysteresis loop, for iron, tends to become elliptical in shape.⁵ Up to frequencies of 1,200 periods per second, however, the loss per cycle does not vary appreciably.³²

In plates of ordinary thickness (0.25 or 0.5 mm.) the loss at high frequencies is chiefly due to eddy currents. Its value can be determined in the following manner:

$$\begin{aligned} \text{Loss} &= \text{Power Factor} \times \text{Volts on Coil} \times \text{Current through Coil} \\ &= \text{P.F.} \times 4.44 B_{\max} A f n \times 10^{-8} \times I_{\text{R.M.S.}} \end{aligned} \quad (6)$$

where $I_{\text{R.M.S.}}$ = Root Mean Square Current (sinusoidal).

$$\text{Now } H_{\max} = \frac{4\pi n I_{\text{R.M.S.}} \times \sqrt{2}}{10l}, \text{ and therefore } I_{\text{R.M.S.}} = \frac{10l H_{\max}}{4\sqrt{2}\pi n}.$$

$$\text{Also from section 3, } B_{\max} = \frac{H_{\max}}{2\pi a} \left(\frac{\mu \rho}{2f} \right)^{\frac{1}{2}},$$

$$\text{or } H_{\max} = 2\pi a B_{\max} \left(\frac{2f}{\mu \rho} \right)^{\frac{1}{2}}.$$

$$\begin{aligned} \text{Thus } I_{\text{R.M.S.}} &= \frac{10l \times 2\pi a B_{\max} \left(\frac{2f}{\mu \rho} \right)^{\frac{1}{2}}}{4\sqrt{2}\pi n} \\ &= \frac{5la B_{\max}}{n} \left(\frac{f}{\mu \rho} \right)^{\frac{1}{2}} \end{aligned}$$

* Calculated on the assumptions that there is no hysteresis and that the permeability is constant.

Substituting for $I_{R.M.S.}$ in (6), and taking P.F. as $1/\sqrt{2}$, we obtain,

$$\text{Eddy Current Loss} = \frac{\pi a f^{\frac{3}{2}} B_{max}^2}{2 (\mu \rho)^{\frac{1}{2}}} \times 10^{-7} \text{ watts per cubic centimetre.}$$

(Compare with (5).) (7)

The formulæ for the eddy current loss may also be written in terms of H_{max} .²⁷

$$\text{Thus at low frequency } W = k_2 \mu^2 f^2 a^2 \frac{H_{max}^2}{\rho} (8)$$

$$\text{and at high frequency } W = k_3 \frac{(\mu \rho f)^{\frac{1}{2}} H_{max}^2}{16 \pi a} (9)$$

The difference between formulæ (5) and (7), and also between (8) and (9), is due to the flux distribution across the section of the iron at high frequencies being non-uniform. In (5) the loss varies directly as the square of thickness, frequency and flux density, and inversely as the specific resistance. In (7) the loss varies directly as the thickness, (frequency) ^{$\frac{3}{2}$} , square of flux density and inversely as the square root of the product of specific resistance and permeability.

In order to show the variation in the iron loss with the different factors in the preceding formulæ, the data in Tables 3 to 8²⁵ have been compiled. The results obtained from formulæ (5) and (8) have been inserted to show that they do not apply at high frequencies when the flux density is not uniform throughout the iron. It should be mentioned that the comparisons between experiment and calculation have been made on the assumption that the eddy current loss is so large that the hysteresis loss can be neglected.

TABLE 3.—Showing effect of specific resistance on loss for given thickness, frequency, and apparent flux density.

$f = 2 \times 10^5 \sim$ per sec. $B_{max} = 200$ lines per sq. cm.

Material.	Watts Lost per Kilogram.	Actual Ratio of Losses.	Ratio of Losses.	
			Formula 5.	Formula 7.
0.25 mm. silicon iron ...	300	} 0.55	0.23	0.48
0.25 mm. pure iron ...	540			

TABLE 4.—Showing effect of specific resistance on loss for given thickness, frequency, and magnetising force.

$f = 2 \times 10^5 \sim$ per sec. $H_{max} = 4$ C.G.S. units.

Material.	Watts Lost per Kilogram.	Actual Ratio of Losses.	Ratio of Losses.		Flux Density.
			Formula 8.	Formula 9.	
0.25 mm. silicon iron ...	1,080	} 3.1	0.23	2.1	{ 425
0.25 mm. pure iron ...	350				

TABLE 5.—Showing effect of thickness on loss for given frequency, specific resistance, and apparent flux density.

$$f = 3 \times 10^5 \sim \text{per sec. } B_{\max} = 150 \text{ lines per sq. cm.}$$

Material.	Watts Lost per Kilogram.	Actual Ratio of Losses.	Ratio of Losses.	
			Formula 5.	Formula 7.
0.47 mm. silicon iron ...	590	} 1.8	3.5	1.88
0.25 mm. silicon iron ..	320			

TABLE 6.—Showing effect of thickness on loss for given frequency, specific resistance, and magnetising force.

$$f = 3 \times 10^5 \sim \text{per sec. } H_{\max} = 4 \text{ C.G.S. units.}$$

Material.	Watts Lost per Kilogram.	Actual Ratio of Losses.	Ratio of Losses.	
			Formula 8.	Formula 9.
0.47 mm. silicon iron ...	520	} 0.42	3.5	0.53
0.25 mm. silicon iron ...	1,230			

TABLE 7.—Showing effect of frequency on loss for given thickness, specific resistance, and apparent flux density.

$$0.25 \text{ mm. silicon iron. } B_{\max} = 200.$$

Frequency.	Watts. Lost per Kilogram.	Actual Ratio of Losses.	Ratio of Losses.	
			Formula 5.	Formula 7.
4×10^5	820	} 2.7	4	2.83
2×10^5	300			

TABLE 8.—Showing effect of frequency on loss for given thickness, specific resistance and magnetising force.

$$0.25 \text{ mm. silicon iron. } H_{\max} = 2 \text{ C.G.S. units.}$$

Frequency.	Watts Lost per Kilogram.	Actual Ratio of Losses.	Ratio of Losses.	
			Formula 8.	Formula 9.
4×10^5	720	} 1.3	4	1.41
2×10^5	540			

At high frequencies the effect of increasing the specific resistance of the iron for definite values of the apparent flux density, thickness

and frequency, is to diminish the loss. For a given magnetising force, the flux density, and therefore the loss, increases with the specific resistance (see Tables 3 and 4).

With a given brand of iron,* an increase in thickness entails an increase in the loss for definite values of B_{max} and H_{max} , at low frequencies. At high frequencies an increase in thickness is accompanied by greater loss for equal values of B_{max} , but the loss is diminished for equal values of H_{max} , owing to the screening effect of eddy currents reducing the flux density (see Tables 5 and 6). The effect of increasing the frequency for given values of B_{max} and H_{max} is to increase the loss (see Tables 7 and 8).

5. VARIATION IN PERMEABILITY WITH TEMPERATURE.

Under small static magnetising forces, say, 0.4 C.G.S. unit, the permeability of iron gradually increases with increase in temperature, until at about 700° C. it suddenly attains a maximum value. When the temperature is increased beyond this point, the permeability immediately falls to unity, the iron having reached the non-magnetic state.¹⁰ For larger values of the magnetising force, say, 4.0 C.G.S. units, the increase in permeability with temperature is more gradual, and there is no peak in the curve showing the relation between these two quantities. Curves illustrating this phenomenon are shown in Figs. 7 and 8.¹⁰

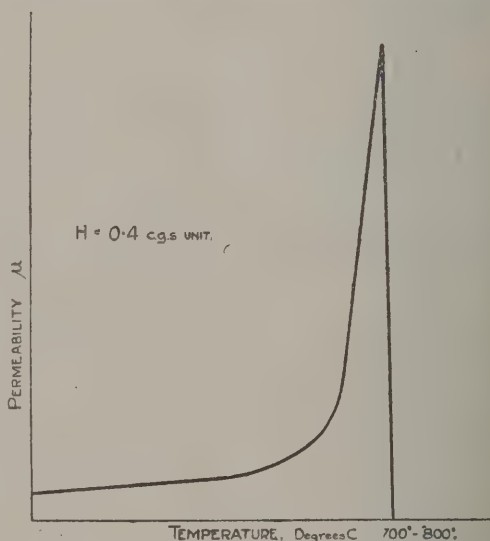


Fig. 7. Diagram illustrating permeability—temperature curve of iron.

If a bundle of iron strips or wires is inserted in a solenoid, wound on a quartz glass tube through which a high-frequency current of suitable magnitude is flowing, the temperature of the iron increases rapidly, due to the large hysteresis and eddy current losses (the latter being the greater). Provided the current through the solenoid is constant in magnitude, the voltage across the terminals will first increase

* When the term "iron" is unqualified, the material to which reference is made is generally pure iron or mild steel. For several years a brand of pure iron known as "Lohys" was used for transformer and dynamo construction. In recent years it has been discovered that the addition of silicon to iron increases the specific resistance considerably, and reduces not only the eddy current loss, but that due to hysteresis. This brand of iron is known as "Stalloy."¹¹

and then decrease below its initial value. This shows that the apparent flux density and therefore the apparent permeability of the iron increases, and then decreases, due to rise in temperature.²⁴ In this case the magnetisation and temperature rise are caused by the same current, whereas under static magnetisation the heat must be supplied from another source.

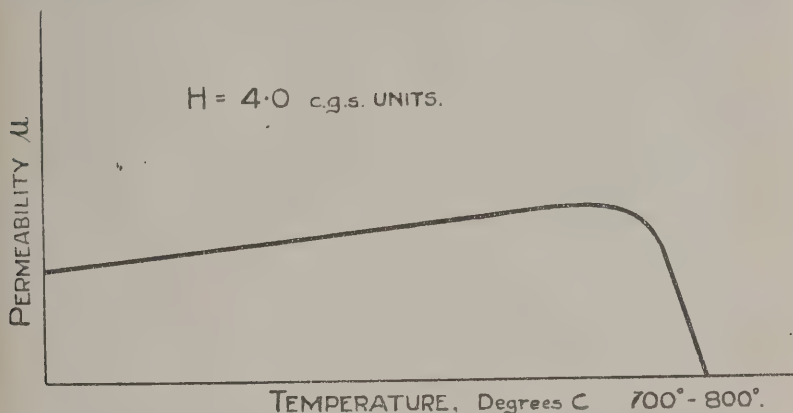


Fig. 8. Diagram illustrating permeability—temperature curve of iron.

When the magnetising force is large enough, a thin strip of iron, inserted in the glass tube, will become almost white hot in a few seconds²⁴ (two or three), and the loss in the iron can attain the high figure of 1.5×10^5 watts per kilogram when the frequency is 2×10^5 periods per second. The magnitude of this loss can be realised when it is remembered that the loss in iron sheets used in the construction of modern transformers is only 0.5 watt per kilogram, the frequency being 50 periods per second.

If the loss varied as the square of the frequency, then at a frequency of 2×10^5 periods per second, it would be $0.5 \times \left(\frac{2 \times 10^5}{50}\right)^2 = 8 \times 10^6$ watts per kilogram, a figure which is considerably larger than that found experimentally, even when allowance is made for the increase in the specific resistance of the iron due to rise in temperature. As shown above, the difference between the results is due to the non-uniform distribution of the flux density over the cross-section.

To reduce the apparent permeability as much as possible, it is essential to conserve the heat generated in the iron due to the energy loss. Whatever precautions are taken, some heat will escape, because the temperature difference between the iron and the external atmosphere is very large. Bearing in mind that the loss decreases with decrease in permeability, it is improbable (unless the magnetising force was extremely large) that the iron could be reduced to the non-magnetic state by high-frequency magnetisation.

If silicon iron, melted in vacuo, is subjected to static magnetisation at ordinary temperatures, a permeability of the order of 6.5×10^4 is obtained for a flux density of about 10^4 lines per square centimetre.⁴¹

This corresponds to a value of the magnetising force of 0.16 C.G.S. unit, and is on that portion of the static magnetisation curve ($B-H$ curve) where the permeability is influenced considerably by temperature.

At ordinary atmospheric temperatures the permeability of iron under static magnetisation is increased, especially on the steep portion of the $B-H$ curve, by the superposition of codirectional or transverse electric oscillations of high frequency (Ref. 8, 9, 11, 12, 28, 29, 30, 30a, 37, 40).

It would be interesting, therefore, to determine experimentally the effect caused by the superposition of electric oscillations on

(1) Vacuum iron at normal temperatures.

(2) Vacuum iron at various temperatures, until the non-magnetic state is reached.

(3) Ordinary iron at various temperatures until the non-magnetic state is reached.

Also to determine whether there is a definite frequency for which the effect at a given temperature is a maximum.

Some experiments have already been conducted regarding (3), but quantitative results were not published.⁴⁰

6. THE USE OF IRON IN HIGH-FREQUENCY APPARATUS.

Iron is used in the manufacture of apparatus for the generation of undamped oscillations of high frequency. In the construction of high-frequency alternators of various types the rotors and stators are built up of iron laminations insulated from each other.^{9, 12} To keep the size of the machine within reasonable limits, and to reduce the eddy current loss, the laminations must be very thin. For a given *flux density*, the thinner the sheets the smaller the loss. There is a limit, however, beyond which it is not economical to reduce the thickness of the laminations. A large number of factors enter into the problem of determining the thickness which gives maximum economy, but the following example will serve to illustrate this point.

The thinner the laminations the greater the cost of producing them, and the greater the cost of constructing a core of given cross-sectional area. If the total flux through the core is fixed, the flux density, and therefore the magnetising force, will increase with decrease in thickness, as the proportion of insulation to iron increases. Thus a greater magnetising current is required with a correspondingly greater copper loss. On the other hand, if the core is solid, the iron loss for a given flux would be very large. Hence somewhere between these limits, there is a certain thickness of iron which gives the best results. This best thickness, however, may be beyond the possibilities of economical manufacture and practical construction.

In large sets for radio-telegraphic transmission, the high-frequency power is obtained by using a low-frequency alternator, an iron-cored transformer and an oscillation circuit containing a spark-gap. This apparatus could be replaced by a high-frequency alternator and a suitably designed pressure transformer. In this case the electromagnetic waves are undamped, which is a considerable advantage in resonance working.

In the design of transformers for high-frequency undamped currents, it is found that the greater part of the loss is in the copper. The flux density for plates 0.03 to 0.05 mm. thick is about 600 lines per square centimetre. Iron-cored transformers, with closed magnetic circuits, are desirable on account of the small volume compared with air-core transformers; also because large stray fields with accompanying eddy current loss is avoided.¹⁹

Large alternating currents of low frequency are generally measured by means of a low-reading ammeter and an iron-cored current transformer, the primary of the latter being in the main circuit and the secondary in series with the ammeter. The ratio of transformation is not equal to the ratio of the turns on the primary and secondary windings for all values of the current and frequency, owing to the iron loss and to the variation in permeability. It is necessary, therefore, to adjust the number of turns on one of the windings to obtain the desired degree of accuracy over the range of current to be measured.

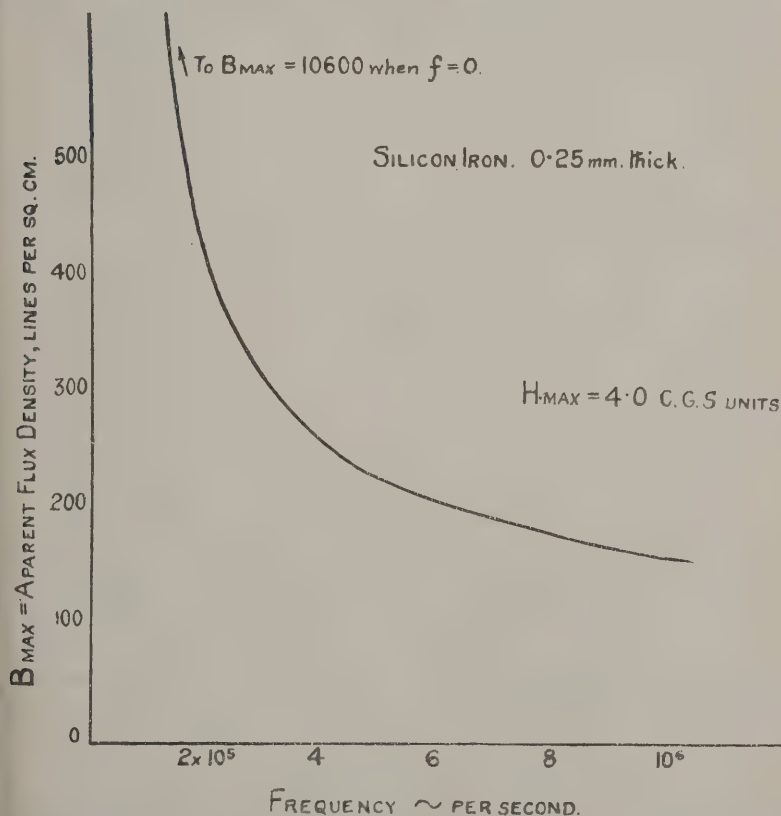


Fig. 9. Diagram showing the maximum apparent flux density B_{max} plotted against the frequency, for a given value of the maximum magnetising current H_{max} .

At high frequencies the error in the transformation ratio can be made very small without altering the number of turns, and is sensibly constant for a wide range of current and frequency.* The iron loss is much smaller than that in a low-frequency transformer of the same size, while the accuracy is greater.^{7, 26} Taken on another basis, the volume of iron required for a high-frequency current transformer is smaller than that for a low-frequency transformer, the error being the same in each case.

The phenomenon occurring when codirectional or transverse electric oscillations are suddenly superposed on iron undergoing slow cyclic magnetisation has not been described, but particulars will be obtained by consulting the references given below. The actions of various forms of magnetic detector depend on the response of iron to electric oscillations—*i.e.*, the change of magnetic condition, under the influence of oscillations of radio-frequency.

Iron is also used in the construction of frequency raisers employed in conjunction with high-frequency alternators. An alternator giving 10^4 periods per second, and a frequency transformer with an 8 : 1 ratio, would yield oscillations having a periodicity of 80,000 per second—*i.e.*, a wave-length of about 3,700 metres.^{15, 33.}

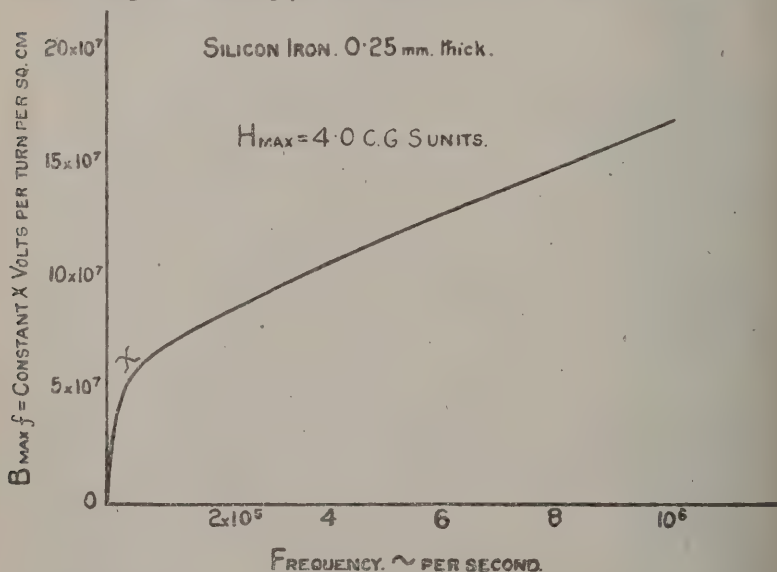


Fig. 10. $B_{max} f$ plotted against the frequency, for a coil of given size and a constant maximum magnetising force.

7. THE EFFICIENCY OF USING IRON AT HIGH FREQUENCIES COMPARED WITH THAT AT LOW FREQUENCIES.

For a given thickness of iron, it has been shown that B_{max} decreases with increase in frequency when the magnetising force is fixed (see

* Transformers of this type have not yet been used for large currents.

Fig. 9). Also for a given apparent flux density the loss increases with increase in frequency. It might be inferred, therefore, that the use of iron at high frequencies would be uneconomical and inefficient. This, however, is not the case.

Consider a coil, the core consisting of thin iron sheets of total cross-sectional area 1 square centimetre, through the winding of which an alternating current of constant magnitude is passed. Neglecting ohmic loss in the winding, the voltage on the terminals of the coil will increase¹ with increase in frequency, in spite of the decrease in the apparent flux density. Since the voltage is directly proportional to the product $B_{max} f$, it follows that $B_{max} f$ also increases with increase

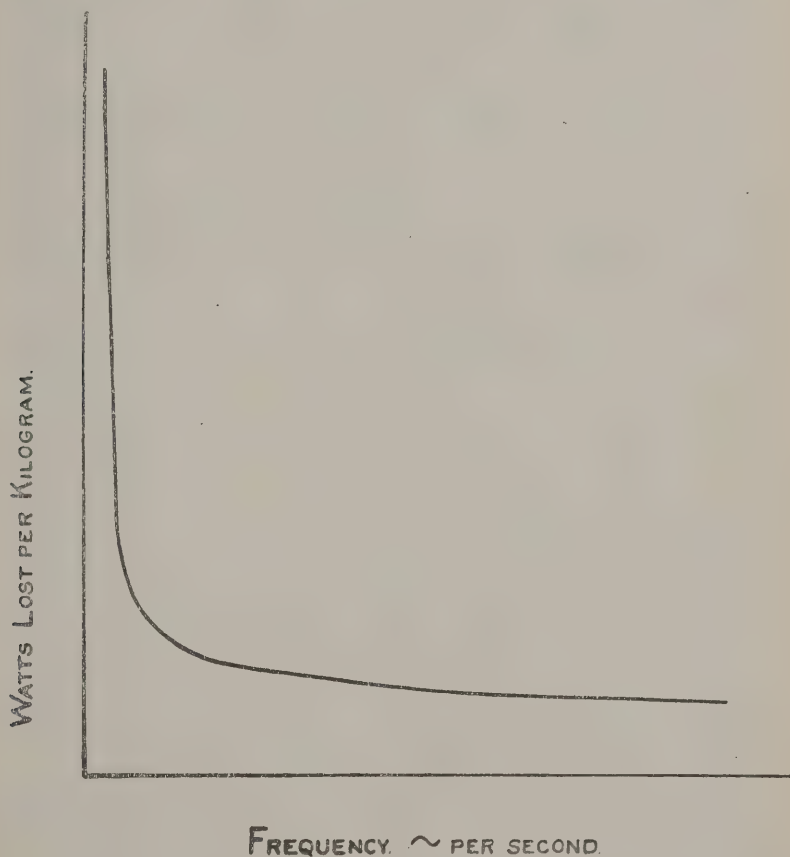


Fig. 11. Diagram showing form of curve obtained when Watts per kilogram, for a definite voltage per turn per sq. cm. of iron—i.e., for a coil of given size and a constant voltage—are plotted against the frequency.

in frequency.* This is illustrated by the curve in Fig. 10.²⁵ The change in $B_{max}f$, and therefore the change in voltage, with change in frequency, is very marked on the initial portion of the curve, but becomes smaller as the frequency increases—i.e., beyond the bend at X. In addition to the increase in voltage with frequency there is also an increase in the watts lost per kilogram of iron.¹ Thus, although the curve in Fig. 10 shows an increase in the voltage obtained from a core of given size under a constant maximum magnetising force, it does not show the advantage of using iron at radio frequencies.

If, however, the watts lost per kilogram for a definite value of the voltage on the coil are plotted against the frequency,¹ a curve of the form shown in Fig. 11 is obtained. It will be seen that the loss decreases rapidly with increase in frequency on the initial part of the curve, but the curve gradually bends round until at high frequencies the variation of loss with frequency is comparatively small.

It is clear, therefore, that *other things being equal*,† it is more efficient to use iron at high than at low frequencies. For a given value of the apparent flux density B_{max} , the thinner the iron and the higher its specific resistance, the greater the efficiency since the eddy current loss is lessened.

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* This is in agreement with theory. From the formula in Section 3 we obtain—

$$(1) B_{max}f = \frac{B_s}{2\pi a} \left(\frac{\rho f}{2\mu} \right)^{\frac{1}{2}} = A_1 f^{\frac{1}{2}} \text{ where } A_1 \text{ is a constant. Hence the product}$$

$B_{max}f$ increases with the frequency, although in practice it does not follow the law indicated by the formula.

$$(2) B_{max}f = \frac{B_s}{2\pi a (\mu k)^{\frac{1}{2}}} = \frac{A_2}{k^{\frac{1}{2}}} \text{ where } A_2 \text{ is a constant. Since } k \text{ decreases with}$$

increase in frequency, the product $B_{max}f$ increases with the frequency.

† See Ref. 2 and discussion thereon, regarding insulation losses and corona discharge in H.F. high tension transformers.

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THE OBSERVATORY TOWER AT SYDNEY (NEW SOUTH WALES).

[To face page 905.]

INTERNATIONAL TIME AND WEATHER SIGNALS

A RÉSUMÉ OF WORLD-WIDE PROGRAMMES.

A SHORT while ago the present writer had the opportunity of inspecting a report to his owners made by the captain of a Dutch liner, wherein the latter entered into details concerning a most difficult voyage. The British mine-fields in the North Sea had recently been extended ; but the Hollander was without any exact knowledge of their lines of demarcation, and of the lanes left through them for the navigation of legitimate traders. Instead of losing time and money by awaiting such information, he started from the New World, trusting to receive the necessary particulars by wireless telegraphy as he went along. His general account of the wireless messages he received, where he got them, what use they proved to him, and so on, form highly interesting reading, but beside our present purpose. One item, however, in his report bears directly upon the subject matter of the following pages. In this particular passage he informs his owners that he " gave the most precise orders that the ship's chronometers should be rigidly controlled by the wireless time signals daily provided through the long-distance stations at Paris and Washington."

Wherein lay the importance of these wireless time signals ? It is not easy to give a *full* explanation without going into a number of scientific details. We may sum up the matter, however, in a general way. Such difficult circumstances as those in which he found himself rendered it of paramount importance to him that his ship should be navigated with more than usual exactitude. Now, a ship's navigation is conducted by the process of regular periodic calculations of latitude and longitude. For latitude the skipper depends upon his solar observations. Longitude he usually calculates by determining through the ship's chronometers at what hour the sun crosses the meridian. The accuracy of this method depends plainly upon the correctness of his timekeeper, and it is wireless time signals which alone enable this correctness to be as rigidly maintained at sea as on land. The vessel in question succeeded, in the face of all her difficulties, in reaching her Netherlands port, and it is hardly too much to say that her success was due to the agency of wireless telegraphy, which shepherded the vessel through the medium of ordinary messages, and enabled her to be exactly navigated by means of wireless time signals.

There are certain well-known " laws " (so called) followed by weather conditions. Even in old days, when voyages had to be performed more or less in the dark, skilful navigators were able to avoid the extreme rigors of tempests at sea by careful study of the theory of storm movements and observation of their barometer. We well remember how emphatically this point was emphasized in a book of reminiscences entitled " Nigh on Sixty Years at Sea," by Captain Robert Woolward, a West Indian skipper of the old school. Wireless telegraphy has ended those days of " groping in the dark," and it is no insignificant fact that as a rule the first wireless messages exchanged between ships just come into touch with one another relate to weather conditions.

Without going into details, it may be stated that the most usual direction (at all events as far as temperate latitudes are concerned)

for meteorological systems to travel, is from a westerly to an easterly direction. That is one of the main reasons why a knowledge of the weather conditions over the Atlantic Ocean is of supreme importance for the calculation of weather forecasts in Western Europe. Before the advent of wireless telegraphy attempts were made to utilise this knowledge by cabling the desired information from the North American coast. But weather systems undergo considerable development in transit over so vast an area as the North Atlantic, and this factor introduced such an important element of uncertainty into the forecasts based upon cable reports as to deprive them of much of their utility. Wireless telegraphy has rendered important service in this respect by making it possible to transmit a great body of information of this character in *time for immediate application*, and practically all British liners engaged in the North Atlantic trade co-operate with the scheme.*

Not only, however, has wireless rendered possible the transmission of weather signals from ships at sea; but it has immensely augmented, and indeed improved almost out of recognition, similar information from land stations. The great long-distance installations collect information from a network of small powered stations, collate the items, and make them up into periodic messages transmitted on known wave-lengths at fixed hours, available therefore for all vessels within their vast range of receptability. Outstanding instances in this respect are the famous stations at Arlington (U.S.A.) now known as "Washington N.A.A.," and the Eiffel Tower, Paris. *The details of their programmes will be found in the following pages.*

We cannot conclude these brief remarks without some reference to the utility of weather signals as adjuncts to scientific farming, and to the possibilities for the future of the utilisation of wireless telegraphy in land surveying, the delimitation of boundaries, etc.

With regard to the former, rather a striking instance came recently under our notice in the case of a young Iowa yeoman who started his interest in wireless telegraphy as a boy of sixteen. The son of a progressive farmer in that essentially agricultural State of the American Union, the young man has turned his hobby to such account as to develop under his own control a highly equipped installation, in receipt of weather reports from all quarters. The enterprising agriculturists of his own State were quick to recognise the practical value, from an essentially commercial point of view, of such messages. Their farmsteads were already equipped with telephones, and the young man's neighbours promptly made arrangements for the information collected by his radiotelegraphic instruments to be telephoned to them at stated hours regularly every day. The young American, when we last heard of him, was farming his own freehold, and made a practice of not only furnishing his neighbours with weather information, but of posting up daily a news bulletin on a large announcement board which he has erected. This wireless centre attracts visitors in cars, on horseback and afoot from all the countryside, and we understand that the enterprising wireless enthusiast has found this fascinating news-board to be extremely "good for business."

With regard to world surveying, we may say that it has already been possible, through radio agency, to determine the differences of

* We are here leaving out of account the conditions imposed by the present war.

longitude between Paris and such places as Algiers, Brest, Bizerta, Brussels, Toulouse and Nice, whilst in July, 1916, by the aid of wireless, the differences in longitude between Paris and Washington were determined to an accuracy within 0·01 of a second.

These Franco-American investigations had extended over two years and nine months, and the result expressed in terms of time was found to be 5 hours 17 minutes 35·67 seconds. Moreover, the Commissioners engaged in the delimitation of Franco-Liberian and Franco-German frontiers in the Congo utilised radiotelegraphy for the determination of the longitudes of the boundaries, an example which was followed also on the occasion of the rectification of the lines of demarcation between Brazil and Bolivia. Our French Allies have demonstrated its extreme utility in this respect by determining numerous points in Morocco, and elsewhere in their Colonial possessions, simply and solely through utilisation of the scientific signals transmitted nightly from the Eiffel Tower. Superior to the trammels imposed in primitive countries by jungle, bushland, deserts and other natural obstacles, radiotelegraphy possesses most important potentialities for future service in the cause of geographical science as well as of commerce. There are yet many parts of the world to be mapped out, which are not only difficult of access, but which also contain districts whose natural characteristics absolutely prohibit the use of ordinary surveying methods.*

The information concerning time signalling and meteorological services, which will be found in the following pages, is a collation of the operations carried out at various wireless stations in different parts of the world. Year by year, at each of our annual appearances, we bring the information up-to-date, and supplement it by such further particulars as we have been able to gather in the course of the previous twelve months. We shall be obliged to any of our readers who may be able to send us further information or details, whether these may be found suitable for insertion or not.

Owing to the present crisis it is not possible to ensure that absolute accuracy of detail and comprehensiveness which we hope to attain in times of peace, but we have spared no pains to place before our readers as full and reliable information as it is possible to publish under present circumstances.

ARGENTINA.

The Naval Observatory at Darsena Norte, situated on the northern entrance to the Port of Buenos Aires, sends out, through the radio station located there, five time signals daily (Sundays and holidays excepted), on a wave length of 800 metres. Their method of transmission consists of the sending of a series of five groups of dashes with a dot at each minute.

The method of transmission is as follows:—

- (a) from 1.55'.00" to 1.55'.50" (Greenwich mean time) a warning signal consisting of an unbroken series of dashes ;
 at 1.56'.00" a dot representing the 1st time-signal.
- (b) from 1.56'.15" to 1.56'.50" an unbroken series of dashes ;
 at 1.57'.00" a dot representing the 2nd time-signal.

- (c) from 1.57'.20" to 1.57'.50" an unbroken series of dashes ;
 at 1.58'.00" a dot representing the 3rd time-signal.
 (d) from 1.58'.25" to 1.58'.50" an unbroken series of dashes ;
 at 1.59'.00" a dot representing the 4th time-signal.
 (e) from 1.59'.30" to 1.59'.50" an unbroken series of dashes ;
 at 2.00'.00" a dot representing the 5th and last
 time-signal.

Time-Signals.			Greenwich time.		Córdoba time.
1st	..	..	1.56'.00"	..	9.39'.11 ⁷⁸ "
2nd	..	..	1.57'.00"	..	9.40'.11 ⁷⁸ "
3rd	..	..	1.58'.00"	..	9.41'.11 ⁷⁸ "
4th	..	..	1.59'.00"	..	9.42'.11 ⁷⁸ "
5th	..	..	2.00'.00"	..	9.43'.11 ⁷⁸ "

Duration of dot = $\frac{1}{4}$ second.

AUSTRALASIA.

The Dominion Meteorological Bureau of Wellington and the shipping companies previous to the war arrived at an agreement with the Commonwealth Meteorological Office at Melbourne for the exchange of news and meteorological information.

Ships are to give information concerning the state of the weather when they are 300 or more miles from the coasts of Australia or New Zealand, or whenever the captain may consider that the atmospheric conditions offer special interest. As far as Australia is concerned all ships which approach or leave Cape Leeuwin will report concerning the atmospheric conditions which prevail.

Until further orders such messages will be accepted on board for transmission without prepayment of charge provided they conform to the following conditions :—

1. That they are written in the special code supplied by the Meteorological Offices.
2. That the messages shall be drawn up by the responsible officer ("observer"), and not by the operator.
3. That the text shall be prefixed by an indication showing whether "Melbourne time" or "Wellington time" is being followed.
4. They shall not deal with other than the following points :—
 - a. Position of the ship.
 - b. The barometric reading.
 - c. The direction and velocity of the wind.
 - d. The state of the weather.
 - e. The condition of the sea.

and they shall be written in the prescribed form.

All telegrams as a rule shall be immediately forwarded by the quickest route and shall have priority as a Government message. For these the ship tax will not be collected.

* * * * *

Time signals are transmitted by the following stations :—

Adelaide Radio At noon and midnight, Adelaide standard time (9½ hours ahead of Greenwich), international time-signals being used.

Melbourne Radio	..	At noon and midnight (Sundays excepted), Victorian standard time (10 hours ahead of Greenwich), international time-signals being used.
Perth Radio	.. ..	At 11 a.m. and 11 p.m. on 600 metres wave-length, Western Australian Standard Time (8 hours ahead of Greenwich).

Ocean forecasts are transmitted by the following stations at the hours specified (Melbourne time) :—

Adelaide, 7 p.m. and 8.30 p.m.
 Brisbane, 10.30 p.m. and 11 p.m.
 Hobart, 10 p.m.
 Melbourne, 7.30 p.m. and 9 p.m.
 Sydney, 8 p.m. and 9.30 p.m.

Other stations may repeat as requested or as necessary.

N.B.—The arrangements given above with regard to meteorological messages from ships would appear to have been temporarily withdrawn but are given here as a matter of interest.

The following note explains the situation as far as New Zealand is concerned, but up to the time of going to press we have no similar information from Australia of any services other than the transmission of time signals and ocean forecasts as referred to above.

NOTE CONCERNING NEW ZEALAND.

The Secretary of the Marine Department states that wireless weather forecasts, which were discontinued at the commencement of the war, have been resumed during 1916, and are sent out through the radio stations at Awanui, Wellington, and Awarua on the usual reporting nights, and at other times when deemed necessary. A daily wireless weather report was authorised from the Chatham Islands wireless station and commenced on April 8th, 1915; it has been maintained without a single break. Part of this message is also transmitted by cable to the Commonwealth Weather Bureau for research purposes. Forecasts are also occasionally transmitted to the Chatham Islands, for which a small charge is made by the Post Office, but usually the Wellington forecast suffices. Macquarie Island radio station was closed on October 14th, 1915. Since it was opened by Sir Douglas Mawson it has done very good work indeed and is one of the most notable researches in meteorology of the day. Since Sir Douglas Mawson sold the establishment to the Australian Government the New Zealand Government has contributed £500 per annum toward its upkeep, mainly the research into Antarctic conditions, and to link up with the Imperial Antarctic Expedition still in the South. It has also proved a valuable aid in forecasting in dealing with westerly storm areas. Some valuable records from the island were lost in the s.s. *Endeavour*, but there is much scope for research work upon the records which remain. The records were not entirely lost, for they had been partly transmitted by wireless before the originals were removed.

BOLIVIA (REPUBLIC OF).

In this republic an important meteorological service is carried on as an auxiliary of the telegraphs. Father Tortoso, Director of the Astronomical Observatory of the San Calixto College, collects and collates a number of data covering his district. The Marconi Wireless Telegraph Station in Viacha possesses also an annexe wherein are installed instruments for this purpose. Small meteorological installations also exist in Tarija, Villa Montes, Ulla-Ulla and Copacabana, whilst others are projected in Cuatro Ojos, and Puerto Suarez.

CANADA.

Important weather forecasts are sent out from various Canadian coast stations to ships upon request. (See note 46 in land stations section, page 628).

CHINA.

The Shanghai-Zikawei station receives the time of the 8th time-belt (120° east of Greenwich) from the Observatory of Zikawei; and transmits it on the wave-length of 600 metres according to the following table :

from 10.53' to 10.54'	a.m.	preliminary signals.
from 10.54' to 10.54'.50"	a.m.	a series of "G."
at 10.55'	a.m.	a dot.
from 10.56' to 10.56'.50"	a.m.	a series of "O."
at 10.57'	a.m.	a dot.
from 10.58' to 10.58'.50"	a.m.	a series of "X."
at 10.59'	a.m.	a dot.
from 4.53' to 4.54'	p.m.	preliminary signals.
from 4.54' to 4.54'.50"	p.m.	a series of "G," etc.,
continuing as in the morning.		

The time-signal, morning and evening, is followed immediately by a meteorological telegram.

During the typhoon season, the station transmits, in addition to these periodical messages, useful information on the state of the weather.

No charge is made for the meteorological information.

EIFFEL TOWER (PARIS).

The following arrangements are based on the decisions arrived at at the International Time Conference held in Paris in 1912 modified in accordance with the teachings of experience :—

The radiotelegraphic station of the Eiffel Tower transmits each day signals and telegrams of general interest, which are enumerated below :—

"Ordinary time signals" sent out thrice daily: (1) at 10 a.m., (2) between 10.44 a.m. and 10.48 a.m., and (3) at 11.44 p.m. to 11.49 p.m., and at midnight.

"Scientific time signals" at 11.30 p.m. preceding the ordinary night time signals, and a correction group (following the ordinary night signals) at 11.50 p.m.

All transmissions are made with a wave-length of about 2,500 metres and using the maximum power which the station has at its disposal.

ORDINARY TIME SIGNALS

At 9.55 a.m. three calls (— — — —) will be given, followed by "ordinary time signals," then the signal "wait" (- — — -).

The "ordinary time signals" commence at 9.57 a.m. and end at 10 a.m. They are transmitted automatically by means of special apparatus situated at the observatory in Paris and managed by the staff of that establishment.

The connection between this apparatus and the radio station at Eiffel Tower is established a few instants before the transmission by means of subterranean lines.

The composition of these signals is given by the illustration on the next page.

The complete minutes 9.58, 9.59, 10.0 are therefore indicated by the end of the 3rd lines of the series of three dashes, all confusion being avoided by the fact that the signals preceding these dashes are different for each minute.

The letters X (— - - —) of the first minute constitute only advice and tuning signals.

All the dashes, dots, and spaces of dots, or dashes of any one letter in the remainder of the signals are of equal duration, dashes=one second, dots=one-quarter of a second, intervals=1 second.

The letters N (— -) which characterise the second minute commence numbers of 10 or more complete seconds plus eights, 8, 18, 28, 38, 48, and the beginning of the dots of these same letters are produced exactly at the tens of seconds 10, 20, 30, 40, 50.

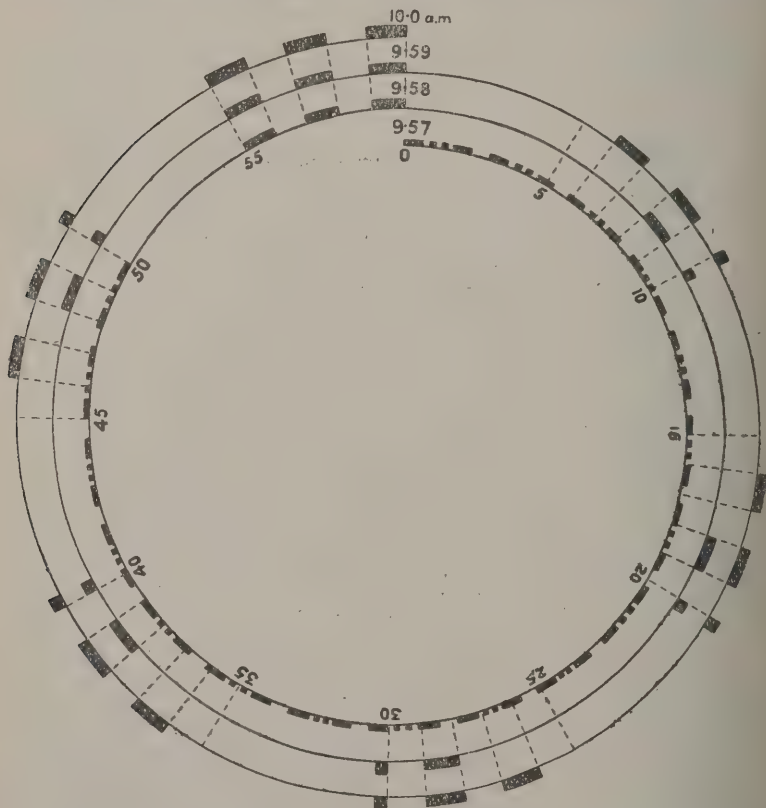
In the same way the letters G (— — -) characterising the third minute commence all numbers of 10 or more plus six, 6, 16, 26, 36, 46, and the beginning of the dots of these same letters are produced exactly at the tens of seconds, 10, 20, 30, 40, 50. The second set of time signals starts at 10.44 a.m. with a series of "T" (one dash), followed by one dot at 10.45 a.m. precisely. At 10.46 a.m. the French operator sends a series of "D" (dash dot dot), which is again followed by a dot at 10.47 a.m., whilst at 10.48 a.m. starts a series of "6" (dash and four dots) again followed by a dot at 10.49 a.m.

The "ordinary time signals" by night are transmitted in the same way.

The calls are initiated at 11.44 p.m. (or 23.44 French time) beginning with a "T" series, followed by a dot at 11.45 p.m., but a "D" series at 11.46 p.m., followed by a dot at 11.47 p.m., and by a "6" series followed by a dot at 11.49 p.m.

For receiving these hourly signals, termed "ordinary," it is only necessary to have the antenna, of dimensions and height varying according to the distance from Paris, connected with a radiotelegraphic receiver, and to listen to the signals, with the clock or watch to be compared in front of the observer. It is easy for an unskilled person to start by estimating the difference up to half a second between the hours indicated by the clock and those which correspond with the signals that are heard in the telephones of the receiver. After some practice it is quite easy to estimate one-quarter of a second. In order to reach an accuracy of one-tenth of a second, it is generally necessary to have recourse to simultaneously recording on the same photographic strip the radiotelegraphic signals and the beats of the clock to be com-

pared. Excellent results have in this way been obtained by various physicists and engineers. It frequently occurs, especially in winter, that the Paris observatory is not able to make astronomical observations each night. It is therefore necessary to be satisfied with the times registered by the chronometers of which the rate is known for the setting of the clock which sends the signals. These chronometers, being sufficiently numerous and accurate, such a procedure causes no inconvenience so long as the cessation of astronomical observations does not exceed a few days. If, on the other hand, the period of cloudy weather continues too long, it is no longer possible to answer for the



The international service of time signals is shown in the above diagram. From the 57th minute of the hour warning signals are sent out consisting of the letter X (— · · —) repeated for fifty seconds, followed by silence for five seconds, after which the first time signal is given, consisting of three dashes each lasting for one second, separated by intervals of one second. Thus the end of the third dash coincides precisely with the end of the 58th minute. Afterwards the letter N (— ·) is sent for every ten seconds, followed by the second time signal, and finally a series of G's (— — ·) followed by a third time signal, the last dash ending precisely at the hour.

accuracy of the chronometers. Wireless telegraphy in such cases furnishes a method which allows of the co-operation of other obser-

vatories, better situated as regards climatic conditions, in the determination of the state of the master-clock at Paris, and in consequence in the accurate setting of the clock which sends the signals.

SCIENTIFIC TIME SIGNALS.

Every night at 11.29 p.m. (23.29 French time) three calls (— — — —) are made.

Starting at 11.30 p.m. (23.30 French time) a series of 300 dots each formed of a single spark are transmitted, the 60th, 120th, 180th and 240th being suppressed in order to establish the indication for counting purposes.

This series is heard (1) at the observatory in Paris in a wireless receiver and compared with the tickings of a time-keeping clock by the coincidence method. A simple calculation permits of passing hours (noted by the clock), of the coincidences to those which are exact to 1 or 2 hundredths, of the 1st and 300th dots of the series, which may be transformed in "legal time hours" by adding the corresponding correction of the clock.

These latter hours are transmitted by the Eiffel Tower soon after the end of the "ordinary time signals" by night, in the following manner:—

If the hours of the first and 300th beats are, for instance, 11 hours 30 minutes 8.15 secs. p.m. and 11 hours 35 mins. 1.17 secs. p.m., the two following groups of figures three times repeated would be transmitted:—

— — — — 300815. 350117 — — — — 300815. 350117
— — — — 300815. 350117.

In order to know approximately the correction to be made to a clock (or a chronometer) with reference to the legal international time of the observatory, it is sufficient to listen to the ticking of that instrument by means of a microphone suitably attached to a radiotelegraphic receiver at the same time as the series of 300 points are transmitted by the Eiffel Tower. It is necessary to observe and note the coincidences, and then the hours of the clock (or the chronometer) should be calculated at the moment of the 1st and 300th dots.

By subtracting these hours respectively from those sent out by the Eiffel Tower, it is possible to obtain two values of the correction of the instrument for measuring time which should be correct to about two hundredths (.02) of a second.

At 11.50 p.m. correction groups for those scientific signals are sent out.

FRENCH OCEANIA.

The Papeete station (Tahiti Is.) transmits every day, including holidays, on the wave-length of 600 metres, two meteorological reports, one at 11 a.m. and the other at 11 p.m. (Greenwich mean time), which are made up as follows:

I.

The reports contain the date of the report of the meteorological station of Point Venus, followed by a group of 8 figures.

The first three figures give the atmospheric pressure in millimetres and tenths of millimetres, the figure denoting hundreds of millimetres

being omitted ; for example the figures 542 would indicate 754.2 millimetres.

The fourth and fifth figures indicate the direction of the wind (Table A).

The sixth figure gives the strength of the wind (Table B).

The seventh figure gives the state of the sky (Table C).

The eighth figure gives the state of the sea (Table D).

In cases where any of the particulars are not known each of the relative figures is replaced by the letter X.

TABLE A.
Direction of the Wind.
4th and 5th Figures.

02 = N.N.E.	10 = E.S.E.	18 = S.S.W.	26 = W.N.W.
04 = N.E.	12 = S.E.	20 = S.W.	28 = N.W.
06 = E.N.E.	14 = S.S.E.	22 = W.S.W.	30 = N.N.W.
08 = E.	16 = S.	24 = W.	32 = N.

Table B.
Strength of the Wind.
6th Figure.

0 = calm.	5 = fresh breeze.
1 = light air.	6 = strong wind.
2 = light breeze.	7 = gale.
3 = gentle breeze.	8 = storm.
4 = moderate breeze.	9 = hurricane.

TABLE C.
State of the Sky.
7th Figure.

0 = clear.	5 = rain.
1 = slightly cloudy.	6 = snow.
2 = cloudy.	7 = mist.
3 = very cloudy.	8 = fog.
4 = overcast.	9 = thunderstorm.

TABLE D.
State of the Sea.
8th Figure.

0 = calm.	5 = rough.
1 = very smooth.	6 = very rough.
2 = smooth.	7 = high.
3 = slightly disturbed.	8 = very high.
4 = moderate.	9 = violent.

The report is preceded by the following signal : " Tahiti observatoire."

II.

Notice to navigators concerning alterations of lightship or light-buoys, the presence of derelicts, and the disappearance of lightbuoys or important buoys, and any other information in regard to navigation, will be added, as occasion arises, in the report. It will be sent out in French and English.

III.

The reports will be transmitted three times in succession; the first time transmission will be made rapidly, the second and third times slowly.

IV.

A safety signal will be transmitted to ships at any hour of the day or night, repeated at short intervals ten times on full power: Tahiti T.T.T., followed by advice of cyclones, typhoons, or derelicts, or any sudden changes in the position or form of fixed obstructions or of land marks. The message will be repeated three times with intervals of ten minutes.

GERMANY (NORDDEICH).*

The Imperial Radiotelegraph Station, Norddeich, emits twice daily, on a wave-length of 1,650 metres, time signals indicating the Greenwich meantime at noon and at midnight—*i.e.*, according to the European mean time usual in Germany, the hours 1 p.m. and 1 a.m.

Time signals are sent out by the Norddeich Station in the following manner at 12.53 p.m. (noon) and at 12.53 a.m. (midnight), Central European time (*one hour in advance of Greenwich*). Norddeich sends out at first, for two minutes continuously, the signal - - - - (V), so that all stations desiring to receive the time signals may tune their receiving apparatus to the wave-length of Norddeich. At 12h. 57m. 47s. the call - - - - - is transmitted, followed by the call signal of Norddeich - - - - - (K A V), and the signals - - - - - M. G. Z. (Greenwich mean time). At 12h. 58m. 38s. the call signal - - - - - is again sent out. Another short interval denotes the close of these preliminary signals, after which the time signal proper is transmitted.

This signal consists of two groups of three, each lasting 5 seconds, and arranged so that each group ends with a full tenth-second, and the last dash of the last group indicates the time—1.0 mean European time. These signals consist of dashes lasting $\frac{1}{3}$ rd of a second. The whole time signal therefore is sent, after the second signal of attention (— - - -) has been given, and after the short interval has elapsed, in the following manner:—

12h. 58m. 46s., 47s., 48s., 49s., 50s.;

One dash lasting $\frac{1}{3}$ second at end of each second.

Interval of 6 seconds.

12h. 58m. 56s., 57s., 58s., 59s., 60s.;

One dash lasting $\frac{1}{3}$ second at end of each second.

Interval of 6 seconds.

12h. 59m. 6s., 7s., 8s., 9s., 10s.:

One dash lasting $\frac{1}{3}$ second at end of each second.

Long interval (26 seconds).

12h. 59m. 36s., 37s., 38s., 39s., 40s.:

* The following arrangements were in operation at the commencement of hostilities. They are reproduced here as a matter of interest.

Of course, under present circumstances, Germany being openly engaged in war against all shipping, neutral and belligerent alike, it will be easily understood that no merchant skipper of any nationality would view any message, wireless or otherwise, from the Central Powers as anything but a lure to destruction. These helpful and life-saving aids to navigation are doubtless no longer transmitted.

One dash lasting $\frac{1}{3}$ second at end of each second.

Interval of 6 seconds.

12h. 59m. 46s., 47s., 48s., 49s., 50s. :]

One dash lasting $\frac{1}{3}$ second at end of each second.

Interval of 6 seconds.

12h. 59m. 56s., 57s., 58s., 59s., and one o'clock.

One dash lasting $\frac{1}{3}$ second at end of each second.

The finish of the last dash indicates the time : it ends at one o'clock Central European time, and the conclusion of the time-signals is distinguished by the following signal : - - - - -, which is transmitted at six seconds after one o'clock.

In order to ensure punctual transmission of the time signal, the Norddeich Station is equipped with a special astronomical precision clock which is regulated by the Imperial Chronometer Observatory in Wilhelmshaven. This clock automatically actuates the radiotelegraph apparatus at the indicated times so that the signals are transmitted with the maximum exactness possible. In case a time signal is transmitted indistinctly or incorrectly, the attention of the receiving stations is called to this fact by transmitting immediately after the time signal the words : "Time signal void."

Meteorological telegrams are sent out daily from Norddeich at 1 p.m. (Central European time). Storm warnings are also transmitted as required and repeated three times, as soon as received. These warnings are repeated thrice immediately after the time-signals at 1 p.m., or 11 p.m. (Central European time).

Bülk in Kiel Bay sends out storm warnings as they are received. These are repeated at 1 p.m. and 11 p.m. (Central European time).

GREAT BRITAIN.*

At 9.30 a.m. in peace time the Admiralty station at Whitehall, in London, sends out a meteorological bulletin. At 10 o'clock the Cleethorpes weather report and forecast is sent out, this lasting about 20 minutes. Whitehall sends out an additional bulletin at 8.30 p.m., Cleethorpes at 10 p.m. The following is a specimen of the Cleethorpes weather report, which is preceded by the call signal CQ. CQ. CQ.

A deep depression, 28.6, is still centred off the south-west of Iceland and pressure remains high over the Alps (Munich 30.5). A fresh secondary has appeared overnight off the west of Ireland, and the barometer is now falling at all western stations.

Forecast.—Strong winds reaching gale force at times from direction between south and south-west probable off all British coasts ; sea rough and weather unsettled, squally and showery.

HOLLAND.

Since July 1st, 1915, the station of Scheveningen Harbour has been sending at 11.15 a.m. and p.m. (Greenwich time) on a wave-length of 1,800 metres a meteorological radiotelegram in Dutch and French, followed by a storm signal whenever necessary, and also a notice to mariners in Dutch and English.

* The proximity of the Eiffel Tower and the elaborate arrangements made by our gallant Ally obviate the necessity for any similar action on the part of Great Britain.

The meteorological radiotelegram is preceded by the letters KNMI, and consists of four sets of two groups of five figures each for the stations Helder, Flushing, Gris Nez, and the Hague; and, further, of four sets of two groups wherein one group has five and the other group four figures each for the stations Yarmouth, Shields, Skudnaes, and Sylt, according to the scheme BBBWW SHTT (G). In this scheme BBB stands for the atmospheric pressure in tenths of a millimeter, omitting the 700; WW indicates the direction, and S the force of the wind; H gives the condition of the sky and weather; TT the temperature in centigrade degrees, 50 being added to temperatures below 0° C.; G indicates the condition of the sea, all being according to the scales given below.

Following the above comes, if deemed important, first, the storm signal—*e.g.*, warning signal, signal of shifting south-east storm; second, the notice to mariners, preceded by the letters NBAZ—*e.g.*, wreck, mouth Hook of Holland.

The scales according to which the above information is reported are as follows:—

Every observation that is missing for each station is replaced by an appropriate number of X's.

Examples of meteorological radiotelegrams from the first and the fifth of the eight sets of two groups KMNI are 69010-21541 and 57316-4405; their translations follow:

HELDER.

Barometer, 769.0 mm.
Wind direction, E.S.E.
Wind force, very light.
Sky, slightly cloudy.
Temperature, 4° C.
Sea, very fine.

YARMOUTH.

Barometer, 757.3 mm.
Wind direction, south.
Wind force, moderate.
Sky, overcast.
Temperature, 5° C.

Wind.				Conditions of sky and weather.		Condition of Sea.	
Direction.		Force.					
WW	Significance.	S.	Significance.	H.	Significance.	G.	Significance.
00	Calm	0	Calm	0	Clear	0	Smooth.
02	N.N.E., etc.	1	Almost calm	1	Slightly cloudy ($\frac{1}{4}$)	1	Very fine.
06	E.N.E., etc.	2	Very light ..	2	Cloudy ($\frac{1}{2}$)	2	Fine.
08	E., etc. ..	3	Light	3	Very cloudy ($\frac{3}{4}$) ..	3	Slightly rough.
12	S.E., etc. ..	4	Moderate ..	4	Wholly overcast..	4	Rough.
16	S., etc. ..	5	Rather high	5	Rain	5	Swell.
20	S.W., etc. ..	6	High	6	Snow	6	Heavy swell.
24	W., etc. ..	7	Very high..	7	Mist	7	Heavy sea.
28	N.W., etc...	8	Violent ..	8	Fog	8	Very heavy.
32	N., etc. ..	9	Storm ..	9	Storm	9	Violent.

INDIA.

Information regarding weather is distributed twice daily by the Calcutta, Rangoon and Karachi stations at 1 a.m. and 1 p.m. *Indian Standard time* (*i.e.* 5½ hours in advance of Greenwich). The stations

at Bombay, Madras and Port Blair, transmit similar information at 1.10. a.m. and 1.10 p.m. *Indian Standard time*. Rangoon and Port Blair transmit on 1,000 metres wave-length, the other stations employ 2,000 metres.

ITALY.

In the Motherland there is no Wireless Station as yet radiating International Time and Weather Signals; but arrangements have been made for the installation of special instruments at the stations of Massaua (in Eritrea, on the Red Sea littoral) and at Mogadiscio, (Italian Somaliland, on the East African coast), as soon as normal peace conditions shall be re-established. These will send out time signals in accordance with the 1912 International Time Conference of Paris.

JAPAN.

Each night except Sunday the Japanese coast station of Choshi transmits on the wave-length of 600 metres, and the station at Funabashi on a 4,000 metre wave, through the connected telegraph wires on land, the mean time of Central Japan (time of the meridian 135° E.), as follows :

From 8.59' 00" to 8.59' 55"	— — — — —, etc.
„ 9.00' 00" „ 9.00' 01"	—
„ 9.00' 30" „ 9.00' 55"	— — — — —, etc.
„ 9.01' 00" „ 9.01' 01"	—
„ 9.01' 30" „ 9.01' 55"	— — — — —, etc.
„ 9.02' 00" „ 9.02' 01"	—
„ 9.02' 30" „ 9.02' 55"	— — — — —, etc.
„ 9.03' 00" „ 9.03' 01"	—
„ 9.03' 30" „ 9.03' 55"	— — — — —, etc.
„ 9.04' 00" „ 9.04' 01"	—

For warnings issued to ships at sea see note 252 on page 641.

TRANSMISSION OF METEOROLOGICAL REPORTS BY WIRELESS TELEGRAPHY.

(Notification of the Department of Communications No. 836, December 11th, 1914.)

Relating to the transmission of storm warnings at the Wireless Stations at Chōshi Radio, Fukkikaku, and Dairenwan.

The storm warnings issued by the Central Meteorological Observatory at Tokyo are transmitted free of charge to vessels at sea from the wireless telegraph stations at Chōshi, Fukkikaku and Dairenwan, according to the following method (it always being understood that this shall not apply in the case of special transmissions made at the request of vessels) :

The storm warnings will be issued in the English language, and will comprise the items referred to in (a) and (b) below :

(a) Text of warning, date, time ; position, rate and direction of movement of centre of atmospheric depression or typhoon.

(b) Maritime instructions and notices. When storm warnings are received at the coastal stations, they will be immediately transmitted, and will be repeated from the Chōshi station at 9.5 p.m., from the

Fukukaku station at 8.30 p.m., and from the Dairenwan station at 9 p.m.

Wave-lengths of 600 metres are employed, and the storm warnings are continued three times after the signal "Q S T" has been thrice repeated.

NOTIFICATION OF THE DEPARTMENT OF COMMUNICATIONS No. 1,105.

From December 11th, 1916, the following procedure for announcing central standard time by wireless telegraphy was adopted at the Chōshi and Funabashi wireless telegraph stations :

Procedure for Time Signalling by Wireless Telegraphy.

1. Every evening, with the exception of Sundays, time signals are automatically made by the transmitting apparatus at the Chōshi and Funabashi wireless telegraph stations, as communicated by the Tokyo Observatory through the connected telegraph wires on land. The wave-length of 600 metres is used in the case of the Chōshi station and that of 4,000 metres in the case of the Funabashi station.

The time to be signalled in accordance with the above is indicated five times—viz., at 9.0 p.m. (Central Japan Standard Time), 9.01, 9.02, 9.03, and 9.04—by means of dashes continuing for one second from the times mentioned, and following the various warning signals distinguished as below :—

(a) The first warning signal, consisting of dashes, will commence at 8.59 p.m., and continue till 8.59.55, after which a suspension of five seconds will be followed by a dash, continuing for one second.

(See diagram below.) :—

	Secs.	0	5	10	15	20	25	30	35	40	45	50	55	h.m.
a	8.59	—	—	—	—	—	—	—	—	—	—	—	—	9.00
b	9.00	]												9.01
c	9.01													9.02
d	9.02													9.03
e	9.03													9.04

(b) The second warning signal, consisting of a long dash and a dot, will commence at 9.00.30 and continue till 9.00.55, after which a suspension of five seconds will be followed by a dash continuing for one second.

(c) The third warning signal, consisting of a dash and two dots, will commence at 9.01.30 and continue till 9.01.55, after which a suspension of five seconds will be followed by a dash, continuing for one second.

(d) The fourth warning signal, consisting of a dash and three dots, will commence at 9.02.30 and continue till 9.02.55; after which a suspension of five seconds will be followed by a dash, continuing for one second.

(e) The fifth warning signal, consisting of a dash and four dots, will commence at 9.03.30 and continue till 9.03.55, after which a suspension of five seconds will be followed by a dash, continuing for one second.

MEXICO.

The coast station of Campeche, Guaymas, Mazatlan de Sinaloa, Payo Obispo and Vera Cruz transmits the time of the meridian of Tacubaya (6h. 36m. 46.67secs. behind Greenwich) daily at noon in the following manner:—

From 11.55 a.m. to noon: repeated transmission of the inquiry signal "CQ"; then repeated transmissions of the signal "XH" (time of Tacubaya);

At noon: transmissions of the word "noon," always followed by a free announcement of the state of the weather.

PANAMA (CANAL ZONE).

Circular No. 643-35, dated Balboa Heights, C.Z., February 21st, 1917, contains the following notice to mariners:—

There has been installed by the Navy Department, at the Darien Radio Station, Canal Zone, a time transmitting clock so constructed as to send time signals by radio. The clock is adjusted daily to Washington Observatory time by radio signal, with a maximum error not to exceed five-tenths of a second, ordinarily not to exceed one-tenth of a second. The signal is sent out by radio each day at 1.00 p.m., 75th meridian time. This signal begins at 12.55 p.m., and continues for five minutes. During this interval every tick of the clock is transmitted by radio except the 29th second of each minute, the 55th to the 59th second of each of the first four minutes, and finally the 50th to the 59th second of the last minute. The 1.00 p.m. signal is a longer contact after the longer break. The wave length used is 4,000 metres and is sent out so that any ship with ordinary commercial receiving apparatus capable of tuning as high as 4,000 metres should be able to receive it.

"2. As the Navy Department of the United States has spared no expense in making the service reliable, it is desired that maximum benefits will result to shipping, and it is hoped that ship captains will communicate with the radio office at Darien, either by letter or radio, giving data as to distance of reception, clearness of signal, etc., in order that the service may be improved. If it is found that many merchant ships cannot tune to the 4,000 metre wave-length, arrangements will be made to send time simultaneously from Colon Radio Station on a spark transmitter with shorter wave-length."

SOUTH AFRICA.

The radiotelegraphic stations at Capetown (Slangkop) and Durban signal at 1.15 o'clock in the afternoon of each day weather reports containing information relative to the meteorological conditions affecting the coastal belt of the South African Union.

The arrangements made in the Union of South Africa for the transmission of radio time signals for the use of shipping in South African waters is as follows:—

A special clock at the Royal Observatory, Capetown, is adapted to give automatically a series of signals of a distinctive character

extending over an interval of half a minute. The clock is brought into conformity daily with the observatory standards shortly before the hour selected for transmitting the signals. The hour chosen is 11 p.m., Union standard time (9 p.m. Greenwich mean time).

The time signal is preceded by the usual warning signal from the radio coast station. The time signal proper consists of twelve dashes, each of about $\frac{1}{4}$ of a second in duration, in five groups, commencing at the following Greenwich mean times:—

Group I.			Group II.			Group III.			Group IV.			Group V.		
h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
8	59	30	8	59	38	8	59	44	8	59	48	8	59	54
—	—	32	—	—	40	—	—	—	—	—	50	—	—	56
—	—	34												58
												9	0	0

The beginning of the last dash corresponding exactly with 9 p.m. Greenwich or 11 p.m. South African standard time.

By means of a special relay, the time signal is simultaneously transmitted to Slangkop (Capetown) and Durban radio stations, the signal to the latter station passing over the land telegraph wire connecting Capetown and Durban, a distance of about 1,100 miles.

SPAIN.

The following message, intended to supplement the Eiffel Tower reports by more detailed information from Spanish stations, is signalled from the Spanish Wireless Station at Carabanchel, Madrid (Call letter E.G.C.) on a wave length of 2,000 metres.

At 1 h. 29 min. G.M.T. for 50 seconds the letters C M A.

At 1 h. 30 min. G.M.T. the letters E O C M (Espana Observatorio Central Meteorologico); followed by:—

(1) Five groups of 8 figures, each preceded by a letter indicating the place to which the observations refer. The code, aaaddfcm, used in these groups is identical with that of the similar groups in the Eiffel Tower message (see above). The stations and hours for which information is given are:—F, Funchal 7 a.m.; L, La Laguna (Teneriffe) 8 a.m.; O, Oran (Algeria) 7 a.m.; Li, Lisbon 9 a.m.; Mh., Mahon (Balearic Islands) 8 a.m.

(2) Seven groups of 10 figures, each preceded by a letter to identify the place of observation. The groups are coded aaab'a'a'dd fc, where the letters have the same significance as in the Eiffel Tower messages, and b'a'a' signifies the change of the barometer since 8 a.m. If the barometer has risen $b'=0$, if it has fallen $b'=5$, a'a' gives the amount of the change in millimetres and tenths, thus 522 indicates a fall of 2.2 millimetres.

The observations are taken at noon. The reporting stations are: B, Barcelona; A, Alicante; Ml, Malaga; Sf, San Fernando; H, Huelva; C, Corunna; Md, Madrid.

(3) A group of 12 figures, ddffddffddff, giving the direction (dd) and force (f) of the wind at 250, 500, 1,000 and 1,500 metres above the ground at Madrid.

(4) A group of 9 figures giving the sea disturbance on the following sections of the coast :—(1) San Sebastian to Santander, (2) Santander and Cape Ortegal, (3) Cape Ortegal to the Portuguese frontier, (4) Huelva to Gibraltar, (5) Gibraltar to Almeria, (6) Almeria and Valencia, (7) Valencia and the French frontier, (8) the Balearic Islands, (9) Algerian coast.

(5) A group of 11 figures, giving weather forecasts.

(6) A group or groups giving the position of the centres of atmospheric disturbances.

* UNITED STATES OF AMERICA.

Time signals are sent out broadcast by the following stations on the Atlantic, Pacific and Gulf coasts of the United States :—

Station.	Call Letters	Wave-Length.	When sent.
Washington	NAA	Metres. 2,500	Daily at 11.55 a.m. to noon and 9.55 p.m. to 10 p.m., standard time, seventy-fifth meridian.
Key West	NAR	1,500	Same as Washington.
New Orleans	NAT	1,000	Daily at 11.55 a.m. to noon, standard time, seventy-fifth meridian.
Darien (Panama)	NBA	4,000	Daily at 12.55 to 1 p.m., standard time, seventy-fifth meridian.
North Head	NPE	2,800	Daily, except Sundays and holidays, at 11.55 a.m. to noon, standard time, one hundred and twentieth meridian.
Eureka	NPW	2,000	Same as North Head.
Point Arguello	NPK	1,512	Do.
San Diego	NPL	2,400	Do.
San Francisco	NPH	2,400	Daily at 11.55 a.m. to noon and 9.55 to 10 p.m., standard time, one hundred and twentieth meridian (damped and undamped waves).
Great Lakes	NAJ	1,512	Daily at 10.55 a.m. to 10 p.m., standard time, ninetyeth meridian.

If for any reason the Washington station (NAA) is out of commission the time signals will be sent daily at noon (Sundays and holidays excepted) by the naval radio stations at Boston (NAD), Newport (NAF), New York (NAH), Norfolk (NAM) and Charleston (NAO).

The time is sent from the Naval Observatory, Washington, for the Atlantic coast, and from the observatory at the Mare Island Navy Yard for the Pacific coast.

The radio sending or relay key in each radio station is connected to the Western Union lines by a relay at about 11.50 a.m., and the signals are made automatically direct from Washington or Mare Island.

Time signals from each of the observatories mentioned continue for the five minutes preceding noon and 10 p.m. During this interval every tick of the clock is transmitted, except the twenty-ninth second

* For Panama Canal Zone arrangements see above under "Panama (Canal Zone)."

of each minute, the last five seconds of each of the first four minutes, and finally the last ten seconds of the last minute. The noon (and 10 p.m.) signal is a longer contact after this longer break.

It is not necessary that an elaborate radio installation be employed for the purpose of receiving these signals nor that a skilled operator be in attendance. Any vessel provided with a small receiving apparatus with one or two wires hoisted as high as possible and insulated from all metal fittings, or preferably stretched between the mastheads with one wire led down to the receiver, may detect these signals when within range of one of the sea-coast radio stations.

These time signals have been used successfully by vessels for rating their chronometers and have been used by surveying vessels in the accurate determination of longitudes.

NOTE.—The lag of the Washington signal has been determined to be about twenty-five thousandths of a second and that of the Key West signal to be about twenty-five hundredths of a second, this lag being due to the various relays in the telegraph lines over which the signal passes from the Naval Observatory. The error of the time signal is generally less than one-tenth of a second.

HYDROGRAPHIC INFORMATION.

Information concerning wrecks, derelicts, ice, and other dangerous obstructions to navigation whenever received from the Hydrographic Office or from a branch hydrographic office or other reliable source is sent broadcast four times daily—viz., at 8 a.m., noon, 4 p.m. and 8 p.m., local (standard) time of station. Ships within range of a naval radio station should be prepared to receive these hydrographic messages at the hours mentioned and should avoid sending radio messages at these times. One vessel sending may prevent several others receiving information necessary to their safety.

Naval radio stations will furnish this information to passing vessels on request, whenever practicable, at other hours than those mentioned above. Should it not be practicable to send out this information on one of the hours scheduled it will be held until the next scheduled time and sent out as soon as practicable after each hour scheduled.

Each day at noon and 10 p.m., seventy-fifth meridian, immediately following the time signal, the Naval Radio Station at Washington (NAA), will broadcast such information relating to safe navigation as may be furnished it by the Hydrographic Office during the preceding 24 hours. The same wave-length, 2,500 metres, used in the time signal will be employed.

METEOROLOGICAL INFORMATION.

Daily weather bulletins relating to the North Atlantic Ocean, the Gulf of Mexico, the Great Lakes, and the Pacific Ocean, prepared by the United States Weather Bureau, are sent broadcast by radio stations as follows :—

The bulletins will begin with the letters U S W B for United States Weather Bureau, and the weather conditions will follow. The first three figures of a report will represent the barometric pressure in inches

(0.02 = 30.02) ; the next figure, the fourth in sequence, will represent the direction of the wind to eight points of the compass : 1 = north, 2 = north-east, 3 = east, 4 = south-east, 5 = south, 6 = south-west, 7 = west, 8 = north-west, and 0 = calm. The fifth figure will represent the force of the wind on the Beaufort scale.

BEAUFORT SCALE OF WIND FORCE.

Number and designation.	Statute miles per hour.	Nautical miles per hour.
0 Calm	0 to 3	0 to 2.6
1 Light air	8	6.9
2 Light breeze	13	11.3
3 Gentle breeze	18	15.6
4 Moderate breeze	23	20.0
5 Fresh breeze	28	24.3
6 Strong breeze	34	29.5
7 Moderate gale	40	34.7
8 Fresh gale... ..	48	41.6
9 Strong gale	56	48.6
10 Whole gale	65	59.4
11 Storm	75	65.1
12 Hurricane	90 and over;	78.1 and over.

In order to simplify the code, no provision has been made for wind force greater than 9, strong gale on the Beaufort scale. Whenever winds of force greater than 9 occur, the number representing them will be given in words instead of figures, thus : ten, eleven, etc.

If the weather conditions from any station cannot be supplied, the initial of the station will be given followed by the word "missing," and if any portion of a report cannot be furnished, such portion will be replaced by an equivalent number of letters x.

EXAMPLE OF CODE.

U S W B T 91674.

Translation.

UNITED STATES WEATHER BUREAU.

Station.	Pressure.	Wind.	
		Direction.	Force.
Nantucket	29.16	W.	4

The second parts of the bulletins contain wind forecasts for the localities concerned.

The forecasts and warnings will be in ordinary language. At the end of the forecasts a statement is made in reference to the location and movement of any barometric depression that may be likely to affect the winds over the ocean and lakes.

All naval radio stations will furnish the above meteorological information to passing vessels on request, whenever practicable.

ATLANTIC COAST.

Sent by Washington (NAA) on 2,500 metres wave-length and Key West (NAR) on 1,500 metres wave-length immediately following 10 p.m. time and hydrographic information (seventy-fifth meridian time).

The coast line is divided as follows :—

North Atlantic—Halifax to New York; Middle Atlantic—New York to Hatteras; South Atlantic—Hatteras to Key West; East Gulf—Key West to mouth of Mississippi; West Gulf, mouth of Mississippi to mouth of the Rio Grande.

This bulletin consists of two parts, the first part containing code letters and figures expressing the actual weather conditions at 8 p.m., seventy-fifth meridian time, on the day of distribution at certain points along the eastern coast of North America, one point along the coast of the Gulf of Mexico, and one at Bermuda. The second part contains a special forecast of the probable winds to be experienced a hundred miles or so off-shore. The second part of the bulletin also contains certain warnings of severe storms along the coast whenever occasion arises.

The points for which weather conditions are furnished by the above bulletin are designated respectively by their initial letter, except in the case of Nantucket, for which the letter T is used; accordingly S = Sydney, T = Nantucket, DB = Delaware Breakwater, H = Hatteras, C = Charleston, K = Key West, P = Pensacola, and B = Bermuda.

GREAT LAKES.

Sent by Great Lakes (NAJ) on 1,512 metres wave-length immediately following 10 p.m. time and hydrographic information (ninetieth meridian time).

This bulletin is sent in a similar manner to the one sent out for the Atlantic coast, except the first part expresses the actual weather conditions at 7 p.m., ninetieth meridian time, on the day of distribution at certain points on the Great Lakes. These points are designated as follows: Du = Duluth, M = Marquette, U = Sault Sainte Marie, G = Green Bay, Ch = Chicago, L = Alpena, D = Detroit, V = Cleveland, and F = Buffalo.

This grouping begins on Lake Superior and ends on Lake Erie.

The second part contains a special forecast of the probable winds to be experienced on the Lakes.

Lakes Superior, Michigan and Huron are considered the Upper Lakes, and Lakes Erie and Ontario the Lower Lakes.

PACIFIC COAST.

Weather bulletins are obtained from the weather bureau at San Francisco by the San Francisco station (NPH) about 6 p.m., and

forwarded by radio to North Head (NPE) and San Diego (NPL) as soon as practicable. San Francisco, North Head, and San Diego radio stations broadcast this weather bulletin on following waves in succession, working wave, 952 metres and 600 metres, immediately after transmission of 10 p.m. time signals, etc. All stations broadcast hydrographic information and storm warnings immediately after receipt, and at 8 a.m., noon, 4 p.m., and 8 p.m. (four-hour intervals immediately after receipt of message except 4 a.m. and midnight). All stations also broadcast their local weather at 8 a.m., noon, 4 p.m., and 8 p.m. Cape Blanco (NPF) broadcasts weather conditions at Tatoosh, North Head (NPE), and Eureka (NPW) immediately after broadcasting local weather report. At 8 a.m. and 8 p.m. Eureka (NPW) broadcasts the 6 a.m. and 6 p.m. weather condition at Farallon Islands; Point Arguello (NPK) broadcasts the 7 a.m. and 7 p.m. weather condition at Farallon Islands; Farallons (NPI) broadcast the 6 a.m. and 6 p.m. Eureka weather condition and the 7 a.m. and 7 p.m. Point Arguello weather condition.

The daily bulletin broadcasted by San Francisco (NPH), North Head (NPE) and San Diego (NPL) will consist of two parts. The first part will contain code words and figures which will express the actual weather conditions at 5 p.m. (one hundred and twentieth meridian time) on the day of distribution at certain points along the western coast of the United States. The second part of the bulletin will contain a special forecast of the probable winds to be experienced a hundred miles or so off-shore, made by the United States Weather Bureau, San Francisco, for distribution to shipmasters by naval radio as above. The second part of the bulletin will also contain warnings of severe storms along the coast as occasion may arise.

The points on the Pacific coast for which weather conditions will be furnished will be designated respectively by their initial letter :—

- T = Tatoosh.
- NH = North Head.
- E = Eureka.
- SF = San Francisco.
- SD = San Diego.

The bulletin will begin with the letters "U S W B S F," signifying United States Weather Bureau, San Francisco, and the weather conditions will follow. The first three figures of a report will represent the barometric pressure in inches (964 = 29.64); the next figure, the fourth in sequence, will represent the direction of the wind to eight points of the compass :—

- 1 = North.
- 2 = North-east.
- 3 = East.
- 4 = South-east.
- 5 = South.
- 6 = South-west.
- 7 = West.
- 8 = North-west.
- 0 = Calm.

The fifth figure will represent the force of the wind on the Beaufort scale.

If the weather conditions for any station cannot be supplied, the initial of the station will be given, followed by the word "Missing," and if any portion of a report cannot be furnished, such portion will be replaced by an equivalent number of letters x.

The coast line of the western part of the United States will be divided as follows :—

Northern Pacific—Tatoosh to Cape Blanco.

Central Pacific—Cape Blanco to Point Arguello.

Southern Pacific—Point Arguello to San Diego.

The forecast and warning will be in ordinary language and will cover a period of 24 hours from 5 p.m., date of issue. At the end of the forecast a statement will be made in regard to the location and movement of any barometric depression that may be likely to affect the winds over the ocean.

Example of forecast and warnings :—

"Northern Pacific missing Central Pacific Wednesday rain heavy southeast winds Southern Pacific moderate southerly winds period Southeast storm warnings displayed Pointarguello to Capeblanco."

HAWAII.

Weather bulletins obtained from the United States Weather Bureau at Honolulu are broadcasted daily by the Pearl Harbour Radio Station (NPM) at 8 a.m., noon, 4 p.m., and 8 p.m.

SAMOA.

Local weather bulletins, preceded by the letter T are broadcasted by the Tutuila Naval Radio Station (NPU) at 8 a.m., noon, 4 p.m., and 8 p.m.

PRESS BROADCASTED.

WASHINGTON.

News bulletins will be broadcasted by Washington on 2,500 metres (spark set) daily at 10 p.m. (seventy-fifth meridian time) immediately after time signals and weather report.

KEY WEST.

News bulletins will be broadcasted by Key West on 1,500 metres (spark set) daily at 10 p.m. (ninetieth meridian time).

SAN FRANCISCO (HILLCREST).

News bulletins will be broadcasted by the Hillcrest station daily on 600 metres (spark set) at 1.15 a.m. (local time).

HONOLULU (WAHIAWA).

News bulletins will be broadcasted by the Wahiawa station daily on 600 metres (spark set) at 11.30 p.m. (local time).

All Government vessels should copy this press in order that it may be posted on board for officers and crew.

(Change 92. Apr. 7, 1917.)

NOTES ON VALVE PATENTS

PUBLISHED IN 1917.

By I. SHOENBERG.

THE number of patents dealing with various arrangements and apparatus for wireless telegraphy shows a marked falling off in 1917 as compared with the preceding years. This is a natural consequence of the war, which not only keeps most of the engineers and scientists to everyday practical routine work, but also makes the publication of certain inventions undesirable.

A very peculiar and significant feature is the predominance, in so far as numbers are concerned, of specifications disclosing the manifold applications to which the thermoionic devices lend themselves so admirably.

The valve (as it is commonly called) has been the subject of careful study ever since Dr. Fleming described its use as a detector. His numerous lectures and articles, in which he laid so much stress on the then very imperfectly known phenomenon of emission of electrons from heated filaments placed in a vacuous vessel, form the basis of all the subsequent developments.

Owing to the complexity of the involved phenomena any analytical treatment is very difficult, and up to the present the investigation of valves has proceeded mainly on experimental lines, by studying the so-called characteristics.

When dealing with a valve of the 3-electrode type, the characteristic usually represents the functional relation between the potential of the grid and the current in the plate circuit. From the typical shape shown on **Fig. 1** we see at once, that the changes in the plate current, resulting from the application of a harmonic P.D. between grid and filament, will depend on the initial potential impressed on the grid.

It is obvious, that with a valve working at a point in the curved portions of the characteristic a symmetrical variation of the grid potential will call forth an assymmetrical variation in the plate current. The mean value of the current variation will be different from zero. We get the so-called rectification effect. It will be seen that the rectification will be the more complete, the smaller the radius of curvature can be made.

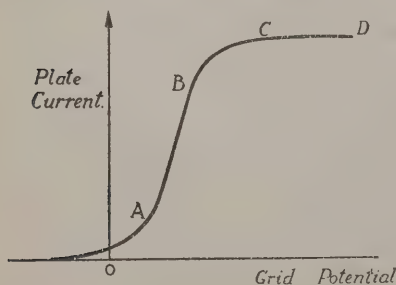


Fig. 1

On the other hand, if the valve has been initially adjusted to a point on the almost straight portion, AB, the variations in the current will be symmetrical (provided the amplitude of the applied variable grid potential does not exceed a certain limit). The amplitude of the variation will evidently depend on the slope of AB. With a fairly steep slope the amplitude of the current variation can be made comparatively

very large even when the amplitude of the applied variable P.D. is very small. We thus get the amplification effect.

Again, since one portion of the characteristic is almost parallel to the horizontal axis, the current in the valve can never exceed a certain value. The valve is therefore a limiting device.

As to the generating properties of the valve, they are intimately connected with its function as a magnifier. For, imagine a small alternator inserted between grid and filament of a valve adjusted to a point on AB. We shall obviously get an A.C. in the plate circuit. We may, however, cut out the alternator and produce the necessary variation of the grid potential by making the plate circuit react on the grid circuit—*i.e.*, by coupling both circuits in any well-known manner. In this way we shall obtain self-sustained oscillations.

Another useful conception is that which considers the resistance of a valve as a function of the grid potential. Assuming the E.M.F. between plate and filament constant, the resistance of the valve will be proportional to the reciprocal values of the ordinates of **Fig. 1**, and we obtain a curve of the shape shown in **Fig. 2**.

It follows then that the valve can be employed as a variable energy absorber, the law of absorption being the same as of the variation of the grid potential.

As we shall see later on, the characteristic given above is not the only one possible. Under certain conditions characteristics can be obtained of the general shape shown in **Figs 3 and 4**.

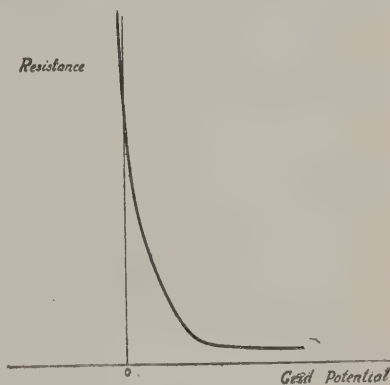


Fig. 2

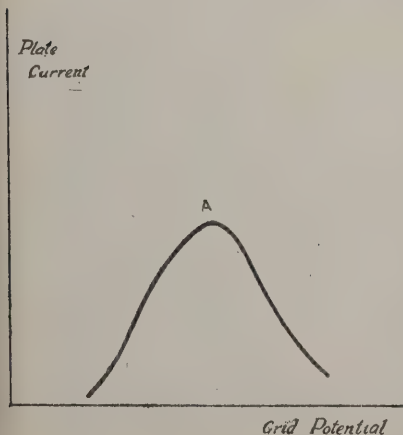


Fig. 3

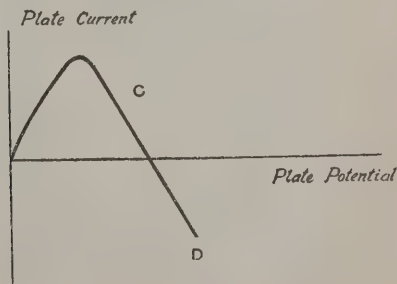


Fig. 4

It will be noted that the horizontal axis represents grid potentials in **Fig. 3**, and plate potentials in **Fig. 4**.

The peculiarity of the characteristic shown in **Fig. 3** consists in the decrease of current on both sides of A. Obviously, if the valve is worked at this point, there will be true rectification—i.e., a variable potential applied to the grid will result for *both* half-waves in a diminution of current.

As to **Fig. 4**, the curve shown there possesses a falling branch CD, similar to the well-known characteristic of an arc. We would therefore expect that, when adjusted to a point on this branch, the valve ought to possess the same properties as an arc. That is to say, generation of oscillations should be possible in this case without any coupling between the grid and plate circuits.

It should be borne in mind that all the characteristics discussed above are *static*, since they represent the change of one variable with a slow increase of the other. The *dynamic* characteristics, which would give the functional relation of the two variables when one of them runs rapidly through a repeated cycle, as in the case of an H.F. oscillation, are as yet very little known. There are, however, certain reasons to believe that, with a sufficiently high degree of vacuum, the difference between the static and dynamic characteristics may be neglected.

We may now proceed to the analysis of the several patents, which

we shall take up in numerical order, since any kind of consistent classification, according to subjects, is very difficult, owing to the fact that in many cases more than one application of the valve is contemplated in one and the same specification. It is also believed that a numerical arrangement will render the present survey more convenient for reference purposes.

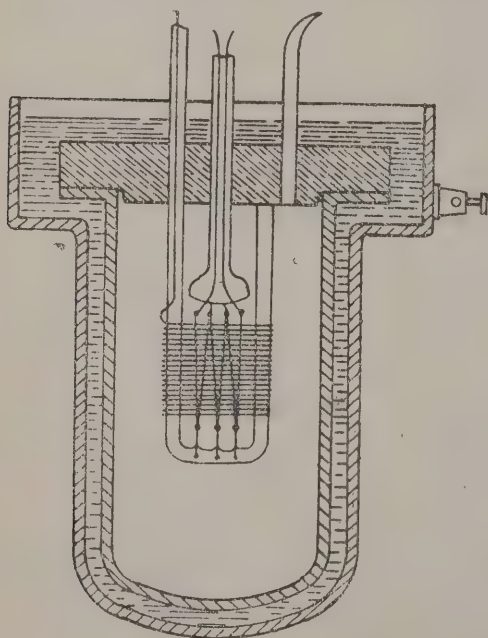


Fig. 5

No. 100,959, by LEE DE FOREST, describes a valve for generating purposes, of which the container of which is made of metal, instead of the usually employed glass. The aim is to provide a generator sufficiently robust to withstand the considerable amount of heat which must be developed when a large

power output is intended. Glass under these conditions is liable to cracking, owing to its softening at high temperatures. On the other hand, a metallic vessel, though mechanically strong enough, is porous and does not allow of maintaining the required high degree of vacuum. The latter difficulty is obviated in the specification by placing one metallic vessel within the other and filling the space between them with mercury, for instance, which seals off the inner highly evacuated container. An example of the proposed construction is shown on **Fig. 5**, which is sufficiently clear without any further explanations.

No. 101,415, by LEE DE FOREST, describes a method of controlling the amplitude of waves generated in the antenna by a valve, for the purposes of wireless telephony.

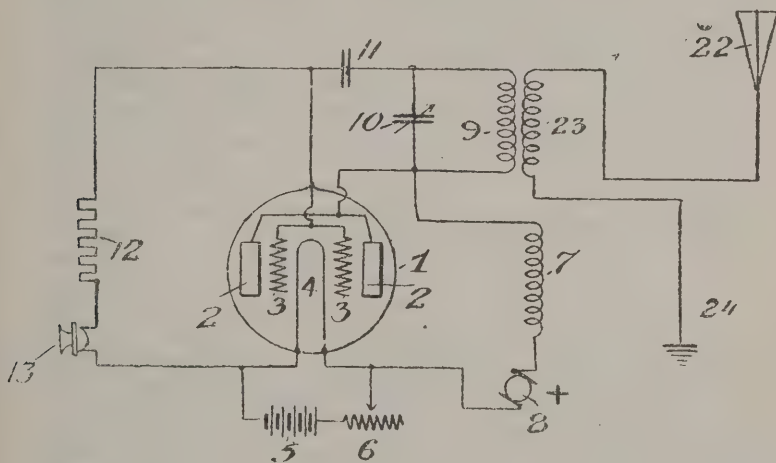


Fig. 6

In **Fig. 6**, 22—23—24 is the transmitting antenna coupled through 23—9 to the oscillating circuit 9—10, which is connected through a condenser 11 to the plate (2—2) and grid (3—3).^{*} The plate circuit contains a source of D.C., 8, and an inductance, 7. The microphone 13 is connected, in series with a resistance 12 (from 25 to 100 ohms), across the filament and grid, forming a leakage path, the conductivity of which will vary with that of the microphone. The inventor finds that with this arrangement the energy of the oscillations produced by the valve will be controlled to a very great extent by the conductivity variations of the leakage path, which variations may be produced by sound waves falling on the membrane of the microphone.

^{*} This is a slightly different arrangement of the usual "oscillation" connections. The coupling between the circuits is here more explicit. For a full treatment see E. H. Armstrong in *Proc. Inst. Radio Engineers*, 4,264, 1916, and G. Valluari in *Jahrbuch für drahtlose Telegr. & Teleph.*, 12,375, 1917.

No. 101,540, by M. I. PUPIN, deals with a resistance compensator. (The arrangement shown in the specification does not include any valve. But, as the same method is applied in later specifications to circuits in which the valve is employed, we give the analysis here.)

Suppose we have the squirrel cage rotor of a single-phase induction motor driven from an external source of energy. Let us apply to the stator a harmonic E.M.F. Then there will obviously be generated currents in the rotor circuits. These latter will react on the stator. In other words, a transfer of energy will take place. When the rotor has reached a certain speed it will be found that the current in the stator begins to grow. Since the applied E.M.F. is supposed to be kept constant, this result is equivalent to a diminution of the stator resistance, or—to the generation of a negative resistance. Professor Pupin has obtained mathematical expressions which give the resistance and self-inductance of the stator as functions of the frequency of the applied E.M.F. (p , say) and the angular velocity of the rotor (ω , say). The law of the resistance variation can also be represented graphically

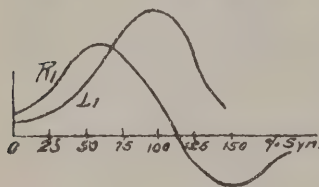


Fig. 7

becomes less negative. The important point is, that to each frequency of the applied E.M.F. there will correspond a well-defined speed of the rotor, at which the maximal negative resistance is generated. It follows that the resistance of a conductor, put in series with the stator, can be reduced by suitably choosing the speed of the rotor. Professor Pupin gives also a method for magnifying the amount of negative resistance, diagrammatically shown in Fig. 8, where 17 and 18 are the terminals of the stator winding 19, 20

—a condenser which neutralizes the self-inductance of 19, for the given frequency, 17—22—23—24—18—the conductor the resistance of which it is desired to reduce. Supposing the induction motor generates in the above described manner a negative resistance R_1 , the resistance of the conductor will be reduced by this amount. A far greater reduction can be attained, however, by connecting across 17, 18 a conductor 21 of resistance R_2 , greater than the absolute value of R_1 , and of inductance zero. In this case, by applying the common formula for resistances in parallel, Professor Pupin obtains for the resulting resistance between 17, 18 :

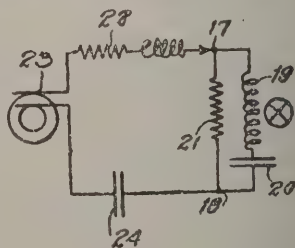


Fig. 8

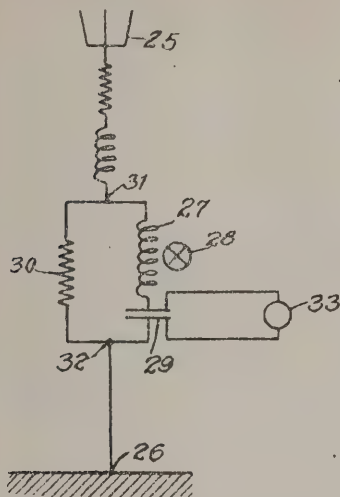


Fig. 9

$$R = R_1 \frac{R_2}{R_1 + R_2}$$

Since $R_2 > |R_1|$, $R_2 + R_1$ is positive and R —negative. Again, since $R_2 + R_1$ can be made very small, R will be much larger than R_1 .

It is proposed to apply the method described above to wireless telegraphy, mainly for the purpose of eliminating strays, in the manner shown on Fig. 9.

25 is an aerial connected to the resistance compensator 27—28, and grounded at 26. The condenser 29 neutralizes the inductance of 27. The resistance 30 (say R_2) is introduced, as explained above, for magnifying the negative resistance (say R_1). Assuming, for instance, $R_2 = 1,000$ ohms and $R_1 = -900$ ohms, we obtain for the total negative resistance between 31 and 32 :

$$R = -900 \cdot \frac{1,000}{1,000 - 900} = -9,000 \text{ ohms.}$$

It follows, therefore, that the antenna can be loaded with an additional resistance of 9,100 ohms, say, and yet oppose to oscillations of the prescribed frequency a resistance of 100 ohms only. For all other frequencies the resistance will be considerably larger. Also, since there is required a certain time for the full process of compensation, an atmospheric disturbance, although it sets up in the antenna oscillations of a frequency to which it is tuned, will die out before the full compensating effect is reached. On the other hand, a persistent oscillation of the predetermined frequency will be received with unimpaired strength.

No. 101,541, by M. I. PUPIN and E. H. ARMSTRONG, covers arrangements identical in principle with those described in the preceding specification. Instead of an inductance motor, however, a generating valve is employed. Bearing in mind the explanations given in connection with No. 101540, it will be easy to see the manner in which the circuits shown on Fig. 10 operate. 19—16—17—18—20 is the conductor the resistance of which it is desired to reduce. 2—3—4—23—5 is the conductor in which the negative resistance is being generated, and has shunted across it the resistance 22 for magnification as explained. The external E.M.F. of given frequency is applied to the points 19 and 21. The circuit 7—6—8, tuned to the frequency of the applied E.M.F., is coupled to 3. The terminals of the condenser 8 are connected to grid and filament through a battery 25 (for the adjustment of the grid potential). The output or plate circuit is coupled

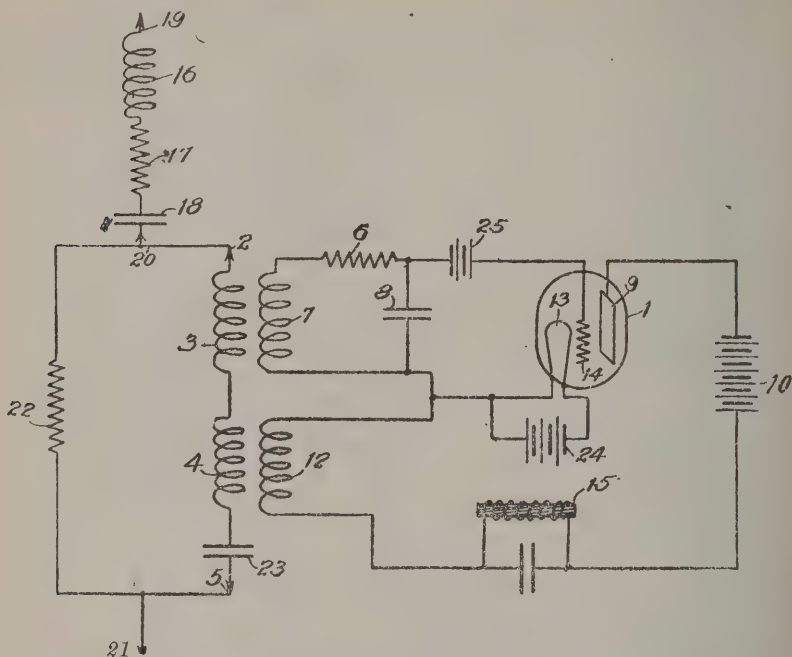


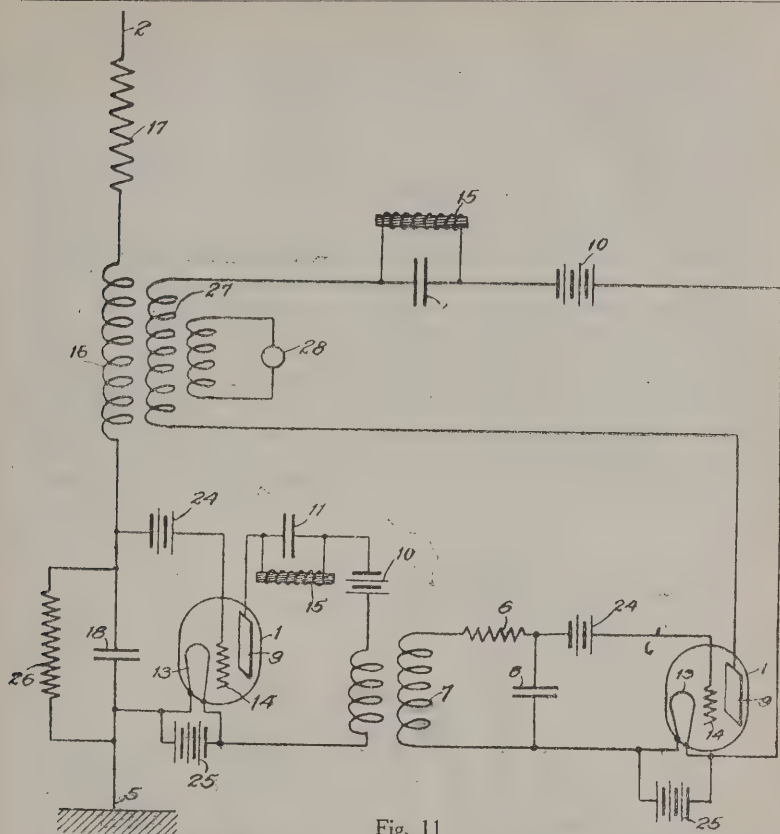
Fig. 10

back with the same conductor through 12—14. It is obvious that the variable potential impressed on the grid will set up corresponding variations in the plate current, and energy will be transferred to the conductor 2—3—4—23—5. The result will be the same as if a part of the resistance had been cut out. The resistance 6 is introduced in the oscillating circuit in order to adjust the time, which must elapse before the process of compensation is completed.

The method of applying the idea to Wireless Telegraphy, mainly for eliminating strays, can be seen from Fig. 11. 2 is the aerial, grounded at 5, in which are inserted a high resistance 17, an inductance 16 and a condenser 18, shunted, as explained above, by a resistance 26 for the magnification of the negative resistance. The impressed oscillations are first magnified by the valve 9—14—13, and then taken through a tuned circuit 6—7—8 to a second valve the plate circuit of which is made to react on the antenna through 16—27. The receiver 28 is coupled to 27.*

The effect which this arrangement is claimed to have on strays is exactly the same as that mentioned in connection with No. 101,540.

* This arrangement, except for the resistance 26, is very similar in principle to those described by Mr. Franklin in 13,636/13 and Mr. Wright in 8926/15.



No. 101,702, by M. I. PUPIN and E. H. ARMSTRONG discloses the method of introducing in the antenna the additional high resistance, which is required in connection with the principle of compensation, described in the two preceding specifications. It is pointed out that, owing to the difficulty of obtaining in practice a uniform wire of the length of an antenna, and possessing several thousand ohms, the necessary high resistance should be introduced in lumps, distributed along the receiving wire at intervals, small in comparison with the wave-length. It is also proposed to concentrate about one-quarter of the additional resistance near the lower end of the antenna, where it is connected to the resistance compensator. It is believed that with this distribution the introduction of resistance will not only reduce the amount of energy resulting from an incoming wave, but will also diminish the amount of energy transmitted to the compensating circuits. Attention is drawn by the inventors to the fact, that in antennæ with uniformly distributed resistance (especially when short aerials are used for the reception of long waves) the effective value of the latter is only a fraction of the total resistance, provided the incoming oscillations are of the frequency to which the antenna is tuned.

No. 102,500, by B. W. KENDALL and the WESTERN ELECTRIC CO., describes an arrangement for amplifying received signals.

The method generally used for the reception of signals transmitted by continuous waves consists in the combination of the received oscillations of frequency N , say, with locally generated waves, of a slightly different frequency N_1 . This results in the production of beats of audible frequency $N_1 - N$ on one hand, and in the amplification of the received signals on the other.

It is obvious that this method is not applicable to the reception of speech, for the beat-note depends only on the difference of frequencies, and in no way on the amplitude-variations of the transmitting wave.

The invention proposes therefore to make $N_1 = N$. The beats will in this case be eliminated while the intensifying effect due to the superimposition of the local oscillations will remain. It is claimed that within certain limits the intensity of the received signals will be proportional to the product $A \times B$, where A is the constant amplitude of the locally generated oscillations, and B — the amplitude of the incoming modulated wave.* The inventor also believes that with the proposed arrangement speech will be reproduced without distortion.

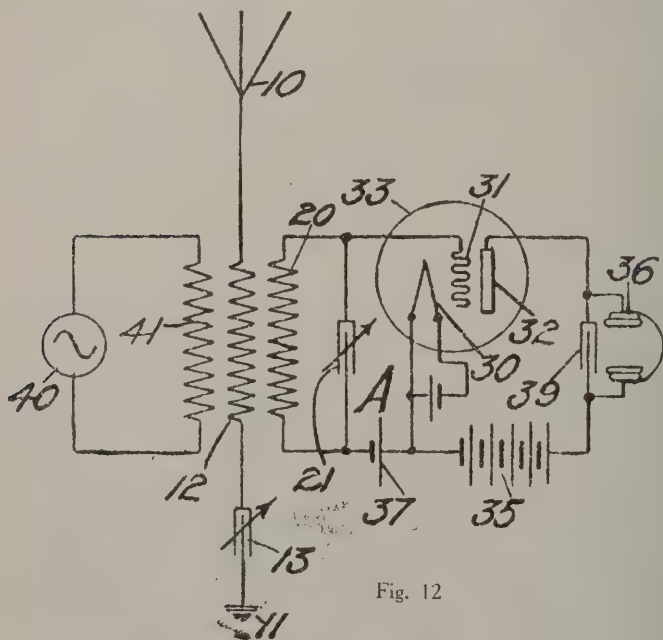


Fig. 12

* This is usually arrived at in the following way: Assuming the intensity proportional to the square of the current (*i.e.*, energy) we shall find that the increment due to the addition of B to A is: $(A+B)^2 - A^2 = 2AB + B^2$, or, if B is small in comparison with A , $2AB$. The degree of magnification which can be obtained by superimposing a local oscillation has lately been much discussed. See B. Liebowitz, *Proc. Radio Engineers*, 5,33,1917. E. Armstrong, *Proc. Radio Engineers*, 5,145, 1917.

The diagram of connections is given on **Fig. 12**, in which 10—12—13—11 is the receiving antenna, 20—21 is an oscillating circuit coupled to the antenna and tuned to the same frequency, 30—31—32 is a valve connected in the usual way, and 40 is an H.F. generator coupled to the antenna and producing in it oscillations of the same frequency as the incoming waves.

It is obvious that, instead of the generator 40, a valve could be used, without departing from the principle on which the invention is based.

No. 102,503, by J. R. CARSON and the WESTERN ELECTRIC CO., covers a system of wireless telephony which is claimed to be considerably more economical than the systems commonly used.

For the purposes of speech transmission an H.F. wave is modulated by impressing on it a current wave, the frequency of which corresponds to the sound vibrations. If the modulated wave is made to cause potential variations in the grid-filament circuit of a valve, there will be called forth in the plate circuit a wave, which can be analysed into three component oscillations, possessing the frequencies $\frac{p+q}{2\pi}$, $\frac{p}{2\pi}$ and $\frac{p-q}{2\pi}$, where $\frac{p}{2\pi}$ and $\frac{q}{2\pi}$ are the frequencies of the H.F. and modulating waves respectively.*

It is obvious that, as the wave of frequency $\frac{p}{2\pi}$ is of constant amplitude, we could radiate from the transmitting station the other two waves only (or one of them) and generate the first wave (of frequency $\frac{p}{2\pi}$) at the receiving station, which would, after combining with the incoming waves, give just the same result as if all the three waves were radiated from the transmitter.

This method leads to great advantages from the point of view of economy in the energy necessary for transmission. In the first place, since the wave of frequency $\frac{p}{2\pi}$ is suppressed, there will be no radiation during the intervals when speech is not being transmitted. Secondly, when the component of frequency $\frac{p}{2\pi}$ is generated at the transmitting station its amplitude must necessarily be large, in order to secure sufficient strength of signals at the receiving end. When generated at the receiving station, a small amplitude will be sufficient.

How it is proposed to carry out the method in practice is shown on **Fig. 13**.

1 is a generator producing oscillations of a high frequency ($\frac{p}{2\pi}$, say) coupled through 3—4 to circuit 5, which is also coupled through 6—7 to the modulating microphone 2. One terminal of condenser 8 is connected to the grid 14 of valve 9 and to the filament 15 of valve 10 ;

* Apart from other waves, which may be neglected owing, either to the smallness of their amplitude, or the order of their frequency, which is too high, and cannot therefore be radiated from the antenna tuned to a frequency lying in the neighbourhood of p .

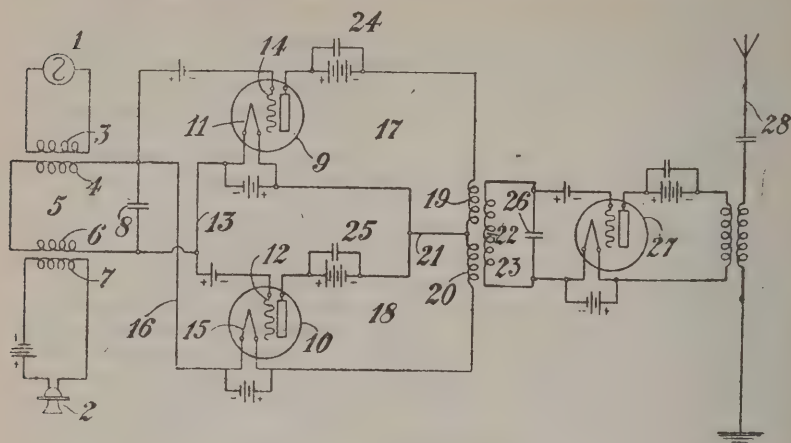


Fig. 13

the other terminal is connected to filament 11 of valve 9 and to grid 12 of valve 10. Owing to this arrangement the variations in the plate circuits 17 and 18 will differ in phase by 180 degrees. Denoting by V_1 and V_2 the voltage variations of the plate circuits, we shall find that the voltage across coil 22, which is coupled through 19 and 20 to both circuits, will be proportional to

$$V = V_1 + V_2 \quad (1)$$

Denoting by v the impressed grid voltage, and taking it with the + sign for one circuit and with the - sign for the other, we can express V_1 and V_2 in terms of v by the power series:

$$\left. \begin{aligned} V_1 &= av + bv^2 + cv^3 \\ V_2 &= -av + bv^2 - cv^3 \end{aligned} \right\} \quad (2)^*$$

where a , b , and c are constants.

From (1) and (2) we obtain:

$$V = 2bv^2 \quad (3)$$

But:

$$V = A \cos pt + B \cos (qt - \phi) \quad (4)$$

where A and B are the amplitudes of the H.F. and modulating waves and ϕ is the phase difference between them. Inserting (4) in (3) we obtain:

$$\begin{aligned} V &= 2b \{ A^2 \cos^2 pt + B^2 \cos^2 (qt - \phi) + 2AB \cos pt \cos (qt - \phi) \} \\ &= b (A^2 + B^2) + A^2 b \cos 2pt + B^2 b \cos 2(qt - \phi) + \\ &\quad + 2bAB \{ \cos [(p+q)t + \phi] + \cos [(p-q)t + \phi] \}. \end{aligned}$$

Now the circuit 23, which is coupled to the plate circuits, is tuned to a frequency $\frac{p+q}{2\pi}$ (or $\frac{p-q}{2\pi}$); therefore the oscillations represented by the second and third term of the last expression will be suppressed, as being in one case of too high and in the other of too low a frequency.

* The higher powers of v are neglected.

The only oscillations which will pass through circuit 23 will be of frequency $\frac{p+q}{2\pi}$ and $\frac{p-q}{2\pi}$ and one of them, to which the circuit is not tuned, will be weakened. It will be seen that the wave of frequency $\frac{p}{2\pi}$ is absent.

The surviving oscillations are amplified by the valve 27, the output circuit of which is coupled to the antenna 28, which is tuned to the same frequency as circuit 23.

The arrangement of the complete station is shown on **Fig. 14**. The left-hand side represents the transmitter and is a repetition of Fig. 16. The right-hand side shows the method of reception. The antenna 100 is coupled to the circuit 62, which contains two valves (of the two electrode type) so connected that both half waves of the incoming oscillation can be utilised. The valves 63 are adjusted to operate as μ current limiters, so that the current in the receiver can

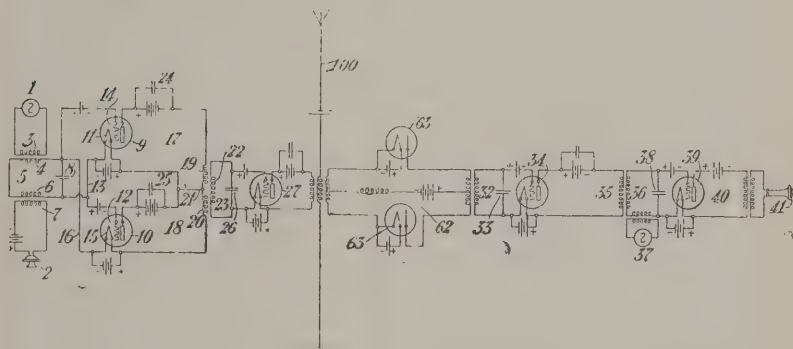


Fig. 14

never exceed the permissible value. The circuit 62 is loosely coupled to circuit 32 tuned to the same frequency as the antenna. The oscillations are magnified by the valve 34, the plate circuit of which is coupled to circuit 36, tuned to the same frequency as circuit 32. The circuit 36 is also coupled to the generator 37, which produces oscillations of frequency $\frac{p}{2\pi}$. The combined oscillation is amplified in circuit 40 coupled to the telephone 41.

It will be noted that when the modulator 2 does not operate, the oscillations generated by 1 will not affect the receiver, owing to the absence of radiation from antenna 100, as explained above.

When the modulator is operating, the receiving circuits will be protected from excessive currents by the limiting properties of the valves 63.

No. 102,589, by the WESTERN ELECTRIC CO., discloses a special construction of a 3-electrode valve, in which the anode is made of a long strip of metal. Owing to the thus increased resistance, the

high temperature to which the anode must be heated in order to drive out the occluded gases, can be obtained with a comparatively low current. The construction has also in view to partly reduce the potential difference between any 2 points of the filament. This is attained by dividing the filament into 3 sections fed separately. The valve is shown on **Fig. 15**, in which 3 is the anode formed of a metallic ribbon, folded in zig-zag fashion and supported by the glass frame 6, 11 is the filament supported by the glass frame 9, 12 is a leading-in wire connected to the filament at the points 13 and 14, 15 is the second leading-in wire connected at the points 16 and 17, 20 and 21 are horizontal and vertical wires which form a cage-like grid. It will be seen that the current from a battery connected between 12 and 15 will flow in three paths: 12—13—16—15, 12—14—17—15, and 12—13—17—15.

No. 102,709, by the **BRITISH THOMSON - HOUSTON CO.** (communicated from the General Electric Co. of America), describes a method of controlling the output of an antenna by sound or other signals.

In general the method is based on the fact, pointed out in the introduction, that the resistance of the valve depends on the potential applied to the grid. Taking, therefore, the case shown on **Fig. 16**, we shall find that the amount of energy delivered from the generator *G* to the resistance *r* will depend on the resistance between *P* and *F*. Supposing the potential of *C* to be so adjusted (by means of the battery *B*), as to

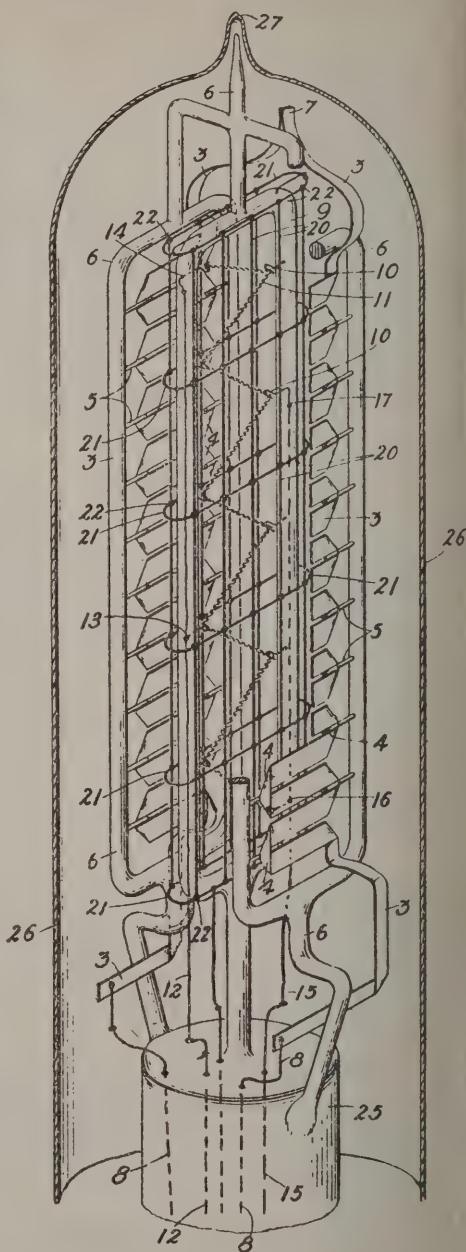


Fig. 15

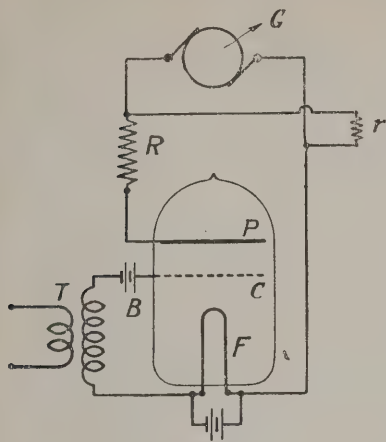


Fig. 16

prevent any current from flowing between P and F , the current in r will be determined, for a constant E.M.F., by its resistance alone. As soon, however, as the potential of C becomes more positive (owing to a current variation in the primary of transformer T , say) a current will begin to flow between P and F , and a certain amount of energy will be consumed by the valve and the resistance R .

Let us now choose R in such a way that the resistance of the valve should become negligible in comparison with it, when the potential of C reaches a pre-determined value. Obviously under this condition the current in the valve can never exceed the

value $i = \frac{E}{R}$, and the potential drop between P and F will vary from E , in the beginning, when there was no current in the valve, to zero, in the end, when the resistance of the valve has become negligible in comparison with R . The average values of the current and potential drop will then be $\frac{i}{2}$ and $\frac{E}{2}$, and the average amount of the energy consumed in the valve during the time t , which it takes the signalling current in the primary of T to produce the variation in the grid potential, will be $\frac{Ei}{4}$.

With this arrangement, however, the controlling of large amounts of energy becomes very difficult owing to the limited consumption-capacity of the valve. It has been proposed, therefore, to employ several valves in parallel, in which case the amount of controlled energy will be proportional to the number of valves. The aim of the present invention is to make the amount of controllable energy proportional to the square of the number of valves.

This is attained by adjusting the grid voltages in such a way that current begins to flow in the valves not simultaneously, but successively. Supposing, for instance, 2 valves in parallel, the grid voltage of the second valve is made more negative than that of the first, and so chosen that current begins to flow in the second valve only after the current has reached in the first its maximal value (*i.e.*, as explained above, when the resistance of the valve has become negligible in comparison with the series resistance R). We have seen already that from this moment all the energy is consumed in the resistance R . It follows, then, that the valves will be under load only half of the time they would be with the usual arrangement. Each valve can, therefore, be made to absorb harmlessly twice the energy. The controlling capacity is thus doubled one time, owing to introduction of two valves in parallel, and once again, owing to the halving of the interval during which each valve

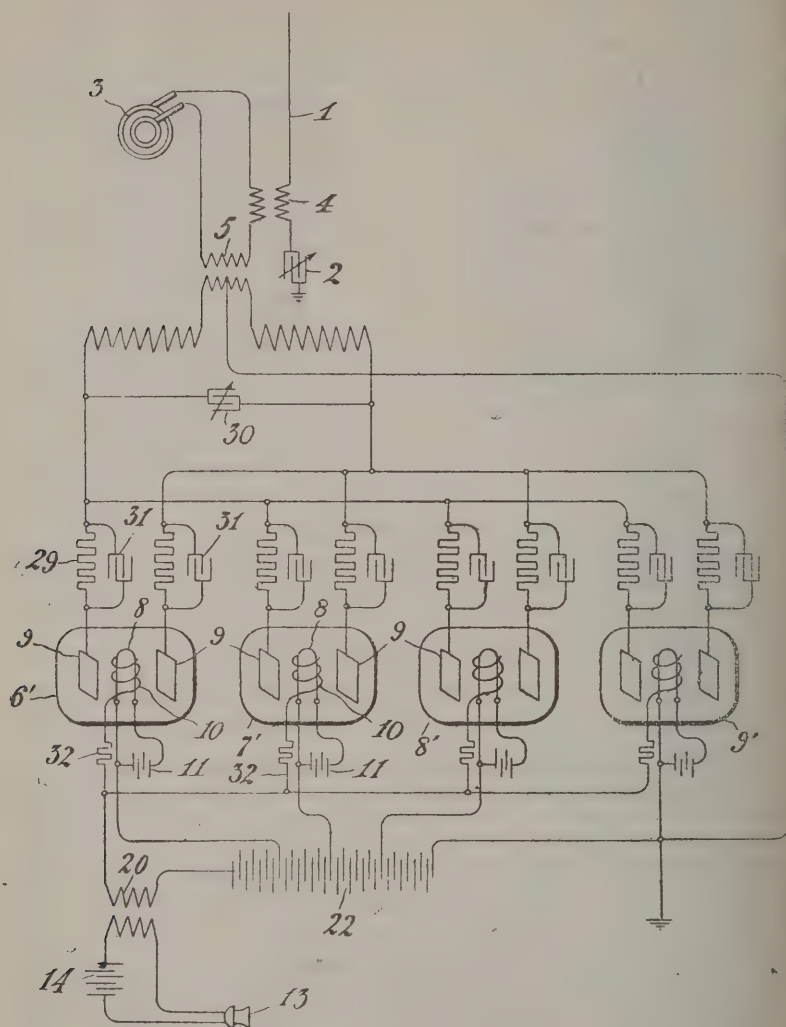


Fig. 17

is loaded. The same reason will obviously apply to n valves, and we may say that the controlling capacity will be n^2 times greater than that of a single valve.

A numerical example will perhaps make the reasoning clearer. Suppose our valve in Fig. 13 can stand a load of 2.5 kw. This would enable to control an energy of 10 kw., represented by 20,000 volts and .5 amp., say. By taking two valves in parallel with the grid voltages adjusted in the manner described above, we could control 40 kw.

(20,000 volts and 2 amp.). For assume that the time which the signalling current takes to raise the grid potential to a value necessary for allowing a flow of .5 amp. in the first case and of 2 amp. in the second is t . At the time $\frac{t}{2}$ there will flow in the first valve a current of 1 amp., and, by properly choosing the value of R , we may neglect from this moment the resistance of the valve, and therefore the energy consumed in it.

The average rate at which energy has been consumed during the interval $\frac{t}{2}$ is $\frac{1}{2} \times \frac{20,000}{2} = 5$ kw. But for the period t the rate will be 2.5 kw.—*i.e.*, the same as in the first case.

The actual arrangement with 4 valves is shown on **Fig. 17.**

1—4—2 is an antenna coupled with a H.F. generator 3. The latter is also connected through transformer 5 to the anodes of the 4 valves 6¹, 7¹, 8¹ and 9¹. It will be noted that each valve is provided with 2 anodes connected to the terminals of the secondary winding of transformer 5, the middle point of which is connected to the filaments. This arrangement allows of absorbing both half-waves of the A.C. generated by 3. The grids 8 are connected through the secondary of transformer 20 to one terminal of battery 22. The method by which a progressively increasing negative potential is created between the filaments and the grids is sufficiently clear from the diagram. The microphone 13 is connected to the primary of transformer 20 through the battery 14. When a current wave is created in the circuit 13—14, current first begins to flow in 6¹, then in 7¹, and so on. 29 is a resistance corresponding to R in Fig. 13.

Owing to the comparatively high capacity between the anodes, high-frequency energy is being absorbed in the valves even when the system is not being used for transmission. To avoid this unnecessary loss the resistances 29 are shunted by capacities 31, which will cut down the H.F. current, but will not interfere with the unidirectional current between anode and filament.

No. 102,821, by G. M. WRIGHT and MARCONI'S WIRELESS TELEGRAPH COMPANY, has for its subject the utilisation of the current-limiting property of valves for reducing the strength of atmospherics.

It has been pointed out in the introduction that the plate current of a valve increases only up to a certain value with the increase of the grid potential. A further increase of the latter does not lead to any change in the current, which remains almost constant. For a given valve the value of the maximal current will be the greater, the higher the temperature of the filament is made. It appears then that, by suitably adjusting the filament-current, we shall get the same variation in the plate current for all grid potential variations, provided their amplitude exceeds a certain predeterminal value. It is easy to see that by applying this method to receiver arrangements, the interference due to strong atmospherics can be largely reduced.

For weak signals, however, the dulling of the filament may prove undesirable on account of the resulting decrease in the sensitiveness of the valve.

The inventor has discovered that a far better limiting can be attained by introducing a second grid. The circuit connections are then made in the usual way, with the difference, however, that the second grid is considered as if it were the filament. With this construction there is no need for reducing the heating current, and the valve can be so adjusted that the limiting point is reached even when a very small P.D. (corresponding to a weak signal) is applied between the two grids.

The diagram of connections is shown on **Fig. 18**.

The antenna *i* is coupled to the oscillating circuit *fg*. One terminal of the condenser *g* is connected, through a resistance *h* across a

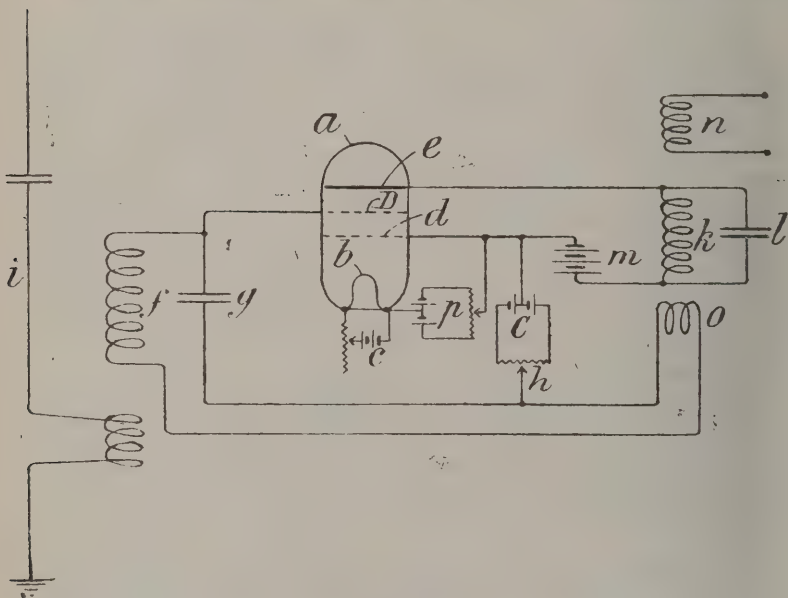
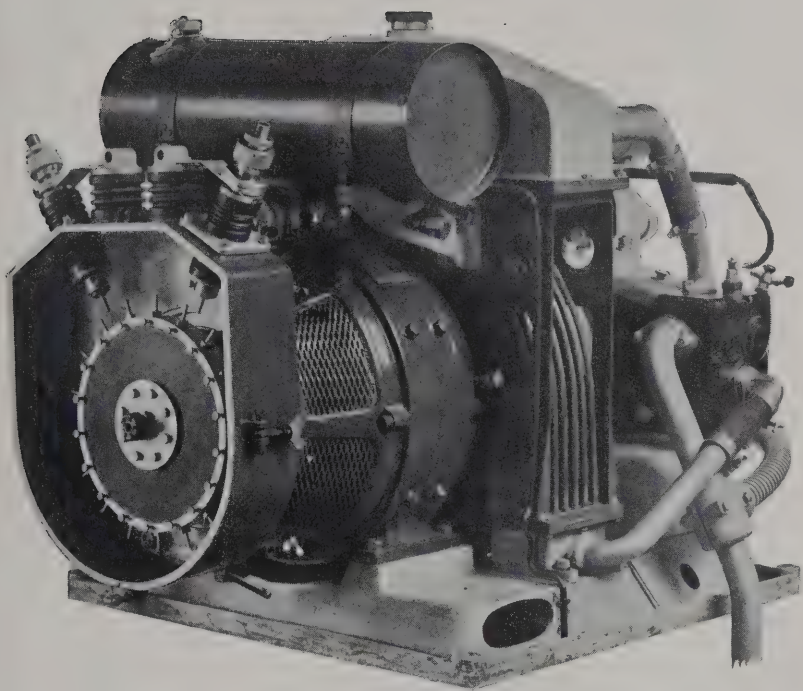


Fig. 18

battery *c*, to the grid *d*, while the other terminal is connected to the grid *D*. The oscillating circuit *kl*, connected through a battery *m* to the grid *d* and plate *e*, is coupled to the receiver *n* and to the coil *o*. The latter is so arranged that any accidental electro-magnetic coupling, which may exist between circuits *fg* and *kl*, is balanced out. The batteries *p* and *C* with the resistances across them are intended for adjusting the P.D. between filament and grid *d* on the one hand and between the two grids on the other

No. 102,822, by G. M. WRIGHT and MARCONI'S WIRELESS TELEGRAPH COMPANY, is very similar in its aims to No. 102,821. It is proposed to use an ordinary highly evacuated valve with a grid of a fine mesh. The oscillating circuit, however, is connected between the grid and plate instead of the usual connection between the filament and grid.



2.5 KILOWATT GENERATING SET.

[To face page 944.]



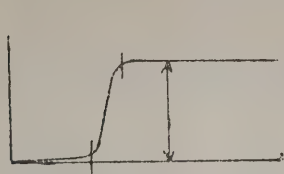


Fig. 19

The inventor states that with the proper adjustments of potentials the space between grid and plate becomes highly limiting even for very low values of current, so that for a given potential of the grid the relation between the plate potential and plate-current can be roughly represented by the curve shown on **Fig. 19**.

It is obvious that even a very strong atmospheric will result in a current not exceeding the limiting value, which can be adjusted to correspond to the strength of the incoming signals. With this method the brilliancy of the filament need not be dulled.

Fig. 20 shows the proposed arrangement for using the valve as a limiting detector, and does not require any further explanations.

The arrangement shown on **Fig. 21** is intended for ob-

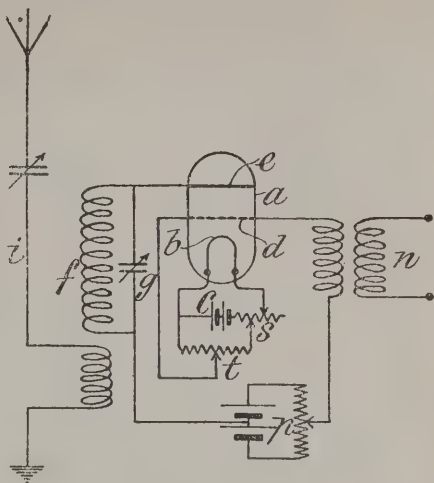


Fig. 20

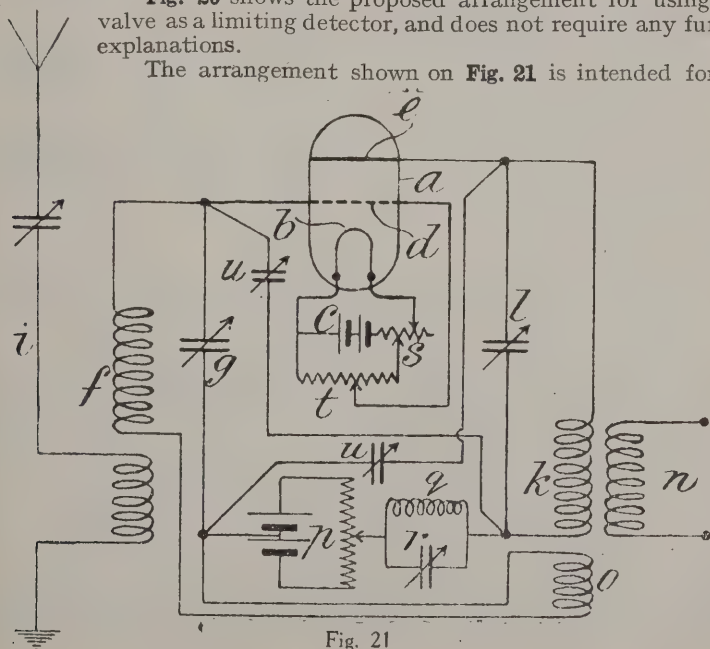


Fig. 21

taining a coupling between the input and output circuits (*fg* and *kl* respectively) through the valve only. The coil *o* balances out any accidental electro-magnetic coupling, while the condensers *u* serve the same purpose with respect to electrostatic coupling. In both last figures *n* is the receiver.

No. 102,823, by G. M. WRIGHT and MARCONI'S WIRELESS TELEGRAPH COMPANY, covers a conductive coupling, identical with the one shown on **Fig. 21**, in the case when a valve of the 2 electrode type is employed.

No. 103,047, by the BRITISH THOMSON-HOUSTON CO. (communicated by the General Electric Co. of America), describes a new construction of an arc generator, as shown on **Fig. 22**.

1 is a glass vessel carefully evacuated of air and then filled with a dry gas, which, while having no chemical affinity for the electrode material at high temperatures, causes a large voltage drop across the arc. While many gases, such as nitrogen, argon, etc., can be used, the inventors prefer to employ hydrogen under a pressure sufficiently high to prevent the electrodes from being electrically disintegrated. The usual pressure is about one atmosphere absolute. The cathode 2, which is made of tungsten or another refractory material, consists of a coil 7 and an arcing tip 8. Current is conveyed from transformer 21 to the coil 7 by the conductors 9 and 10 in order to heat the cathode. The anode 3 is made of tungsten, although carbon, iron, etc., may be used.

6 is a source of D.C. connected to the arc through a resistance 18, inductances 19, 20, and a switch 22.

The arc is started by first heating the cathode 2. When the gaseous path has been made sufficiently conductive, the switch 22 is closed. A continuously working arc will establish itself and will keep the cathode hot, even when the supply from 21 is cut off.

The arc is shunted in the usual way by a condenser 13 in series with the inductances 14 and 15. Oscillating currents will be generated in the shunt just in the same way as with a Poulsen arc. 16 is the consuming circuit.

No. 103,865, by the BRITISH THOMSON-HOUSTON CO. (communicated by the General Electric Co. of America), discloses a method for utilising the valve as a generator, by suitably adjusting the grid and plate potentials.

Let us make the grid highly positive. If the plate is kept at the same potential as the cathode, no electrons will escape through the grid, and there will be no plate current. By impressing on the plate a positive potential we shall cause a portion of the electrons to pass through the grid and strike the plate with a velocity, which will depend on the value of the applied potential. The plate current will thus grow with the increase of the P.D. between filament and plate, until this P.D. reaches such a value that, owing to the high velocity of the striking electrons, secondary electrons begin to be liberated from the plate. If the plate potential is still further increased the current will begin to fall, for the liberated electrons will leave the plate, owing to the attraction of the more positive grid. By continuing to increase

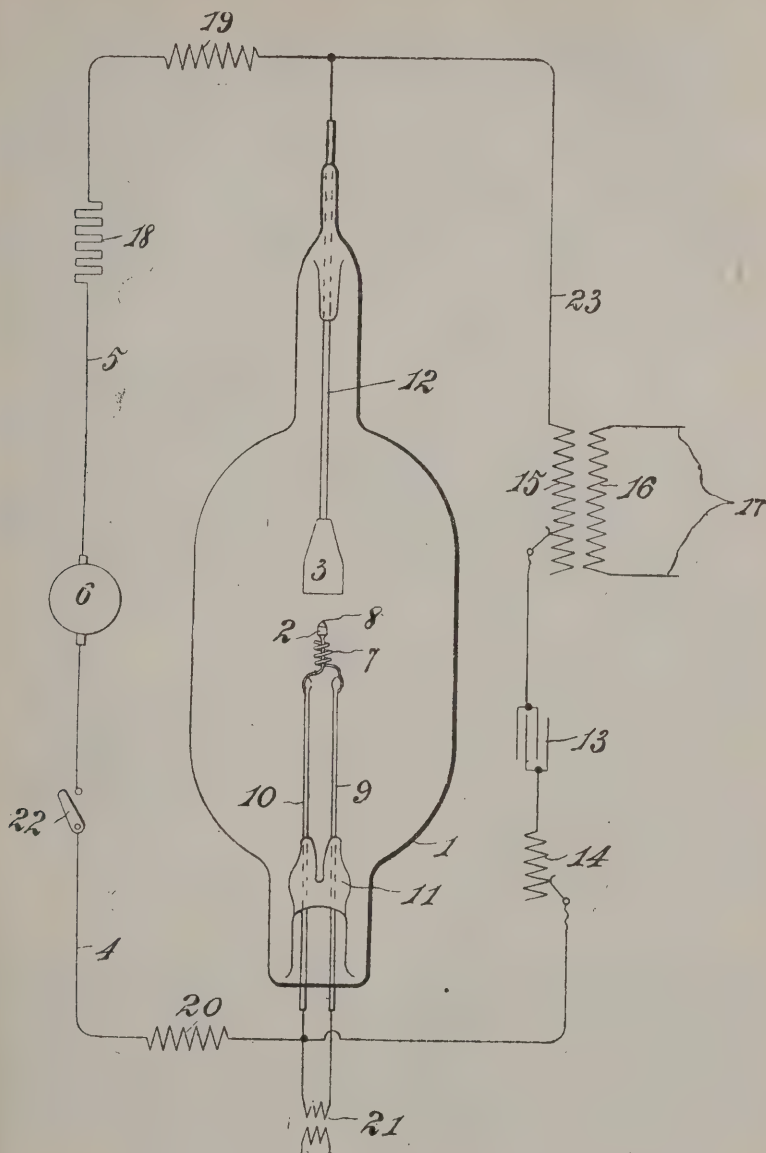


Fig. 22

the plate potential a moment will arrive when for each electron striking the plate another will be liberated from it. The plate current will then be zero. Beyond this point, an increase of the plate potential will cause an excess in the number of liberated secondary electrons

over that of the primary ones. More electrons will leave the plate than reach it. The plate current will therefore be reversed and reach

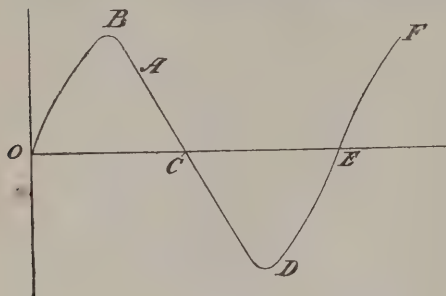


Fig. 23

the plate and do not return is equal to the number of primary electrons which strike it, the current will become again zero.

The functional relation between the plate potential and plate current is represented graphically by the curve shown on Fig. 23, which with the explanations given above needs no further comment.

It will be noted that the Branch BD is what is commonly called a falling characteristic, similar to the characteristic of an arc. We must therefore expect that with the proper adjustment of the plate and grid potentials the valve can be used for generating oscillations. This is what actually happens, according to the specification, when the preferable method of connections shown on Fig. 24 is adopted.

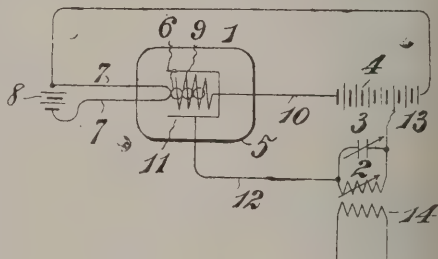


Fig. 24

No. 104,230 by the BRITISH THOMSON-HOUSTON CO. (communicated by the General Electric Co. of America), describes a method of maintaining a very high vacuum in an X-ray tube.

It is suggested that a metallic ring should be mounted on the cathode in order to attract the positive ions which must be formed during operation, if a residual gas is present in the envelope. Owing to the impact some of the material of ring will be sputtered, causing the gas to be electrically precipitated.

The ring must be made of copper, or any other material which can be readily disintegrated by ionic bombardment.

No. 104,566, by S. G. BROWN, covers a method of utilising a valve of the 2 electrode type as an amplifier.

In the diagram shown on **Fig. 25**, B is the cathode, in the form of a very fine filament (about 1 mm. in diameter), d — the heating battery and d_1 — the secondary winding of a transformer, the primary of which is connected through the battery e_2 to the microphone e_1 . C is the anode, f is a battery, and f_1 is the primary winding of a transformer the secondary of which is connected to the telephone g' .

By speaking in the microphone, oscillatory currents will be set up in the filament. Owing to the very small diameter of the latter,

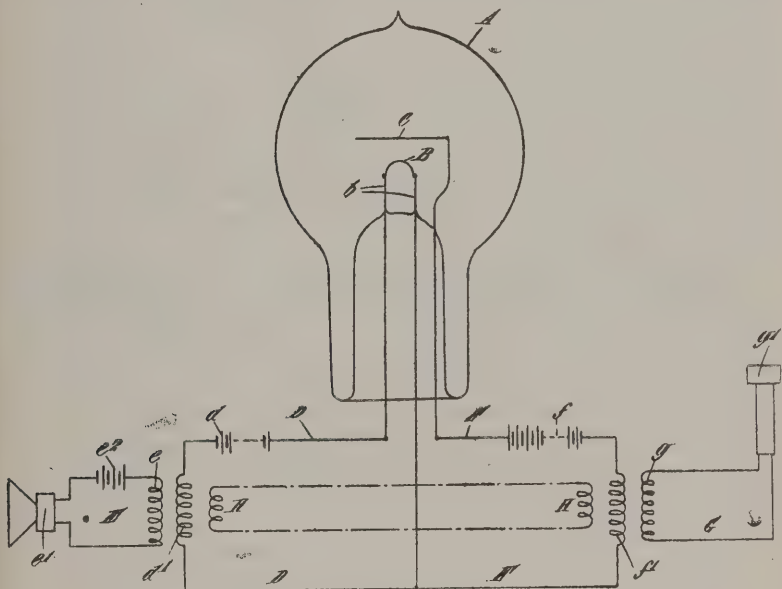


Fig. 25

its temperature, and therefore the conductivity of the gaseous path between B and C , will vary in accordance with the current variation. By properly adjusting the potential of the plate and the value of the heating current, the amplitude of the resulting oscillations in the plate circuit can be made large in comparison with the variations in the filament circuit. The magnification of signals thus obtained can be further increased by means of the circuit $H-H$, which couples the plate and filament circuits.

No. 105,081, by F. P. SWANN and MARCONI'S WIRELESS TELEGRAPH COMPANY, describes arrangements with a valve, which possesses a rising and falling characteristic of the shape shown in Fig. 3.

The maximum value of the plate current will depend on the plate

potential. This can be seen from **Fig. 26**, in which *I*, *II*, and *III* represent the relation between grid potential (abscissæ) and plate current (ordinates) for three successively increasing values of the plate potential.

As to the conditions under which a rising and falling characteristic can be obtained, the inventor specifies them for one practical case in the following statement:

"In a valve in which the anode is a cylinder 3 cms. in diameter and the grid a cylinder 1 cm. in diameter formed of wire $\frac{1}{8}$ of an inch in diameter with 32 meshes to the inch, when the usual magnification is desired the filament is heated to brilliancy by a current of 2.8 amperes, while the tension of the anode varies from 100 to 500 volts according to the degree of vacuum. To obtain a rising and falling characteristic, on the other hand, the current in the filament is reduced to 2.2 amperes so that the filament is dulled, while the tension on the anode is only 4 volts as a maximum."

One advantage connected with this peculiar type of characteristic, consisting in the rectification of both half waves, has been pointed out

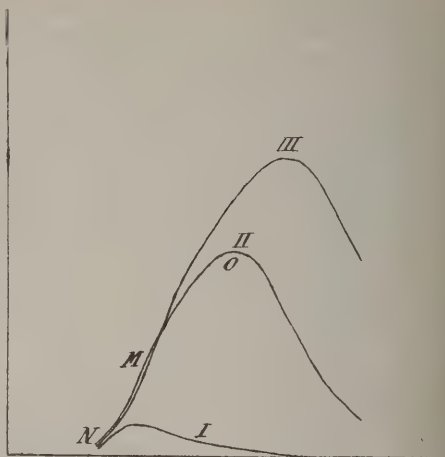


Fig. 26

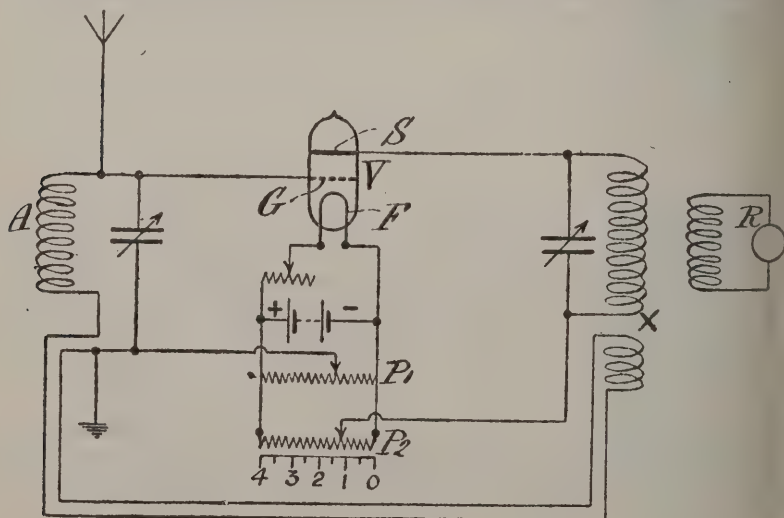


Fig. 27

already in the introduction. It is also obvious that with the proper adjustment such a valve may be employed as a limiter for the same purpose as in specification No. 102,822.

One method of arrangement is shown on **Fig. 27**, in which P_1 and P_2 are the potentiometers for adjusting the grid and plate potentials, X a reactive coil for balancing any accidental coupling between the inner and outer circuits, and R the receiver.

No. 109,358, by the BRITISH THOMSON-HOUSTON CO. (communicated by the General Electric Co. of America), describes a method of maintaining a high vacuum in an envelope. The same method can also be employed for purifying a rare or noble gas such as argon, neon, etc.

It is proposed to introduce into the evacuated envelope a small quantity of thorium or zirconium, or any other metal of the rare earth group, in the form of a fine powder. When the metal is heated (by a gas flame, for instance) all the gases, such as H , O , N , etc., which are capable of chemical combination with it, get removed, the metal and the gases forming a stable compound of low vapour pressure.

It is also claimed that the deposit of metal on the cathode, which is due to electrostatic attraction and mechanical pulverisation, materially increases the emission of electrons, so that comparatively large currents can be obtained even at a low degree of incandescence of the cathode.

WIRELESS POSSIBILITIES

SPECULATIONS UPON THE FUTURE OF RADIOTELEGRAPHY AND ALLIED DEVELOPMENTS: THE FORTHCOMING DEMAND IN ANGLO-SAXON COUNTRIES FOR SPECIALISTS IN THIS RAPIDLY WIDENING FIELD OF ACTIVITY.

By A. R. BURROWS.

MANY mysterious happenings in this great world contest of force and ingenuity have been credited to "wireless." Proud warships, manned by the bravest and sturdiest seamen the world has known, and equipped with the finest products of modern engineering, have gone sky-high in a cloud of fragments when lying peacefully at anchor; wonderful airships (revealing great skill in design and delicacy of structure), which years of practical experience have shown to be capable of riding buoyantly even in the rarer airs of higher altitudes, have fallen ignominiously to earth, mere tangled heaps of metal and machinery at the moment when they were expected to fulfil the hopes which had been placed in them.

After all such "ups and downs," the word "wireless" has been whispered abroad as the mysterious agent of destruction, and, although certain wise restrictions forbid discussion upon the extent to which such interpretations are justified, the credence attached to such suggestions indicates very clearly a certain inherent faith in the possibilities surrounding etheric phenomena.

In several secret services forming essential parts of the modern war machine wireless undoubtedly has an important place. It has worked, and continues to work, unobtrusively, and in many instances has fully justified its application. Occasionally a peep behind the scenes is afforded through some ephemeral departmental *communiqué*, but otherwise strict silence has to be preserved.

Being deprived, therefore, once again of a most fascinating subject for discussion, some thoughts may be given to that keenly anticipated and highly problematical era—after the war. What can "wireless" do to repair the havoc wrought by the present unprecedented struggle? Have any discoveries been made since that fateful August of 1914 which suggest new spheres for "wireless" activity? What of the much-heralded Wireless Age?

The whole realm of nature is under wireless control. This fact, expressed in all reverence, is a natural source of optimism to all engaged in radio research, and strengthens the belief, claiming fresh adherents daily, that radiotelegraphy, which even now is still in its infancy, lies but on the fringe of a vast field of discovery. Viewed in the same light, one sees in the pioneer researches of Hertz and Marconi, not so much subjects for wonderment, as indications of man's closer understanding of the great natural forces.

Wireless, of course, makes unusual claims upon the imagination. Although on the one hand the wireless control exercised by the sun at a distance of some ninety odd millions of miles produces very perceptible

effects upon our personal comfort and the growth of vegetation, the etheric waves generated artificially to date for the conveyance of Morse signals over the relatively small terrestrial intervals of apparent space affect none of our known senses. For well over a decade incessant groups of vibrations, constituting recognisable signals, have been radiated from all parts of Europe, and have been passing through the bodies of each one of us, yet their presence has not been felt, and few outside the world of radiotelegraphic research have even thought of their existence.

Bearing in mind the natural transmission of light, heat, and energy over such vast distances as astronomical calculations have revealed, no excuse appears necessary for the suggestion that most startling discoveries and surprising applications of wireless control may be expected in time. Each new development suggests that if it is wise to use common sense in discriminating between the probable, possible, and extremely unlikely, in connection with affairs attributed to "wireless," consistent scepticism is equally inadvisable. The brief history of wireless telegraphy already teaches one that scepticism, even from those possessing the most intimate knowledge of scientific principles, is a dangerous enemy to progress.

One of the most interesting possessions of Marconi's Wireless Telegraph Company is a collection of Press cuttings dating from the time of Mr. Marconi's arrival in England. In view of the present position of radiotelegraphy, many of these cuttings read like extracts from comic journals, and not the serious expressions of weighty organs of public opinion. Nothing could demonstrate more clearly the ease with which dispassionate thought can be disturbed and how powerful are the human frailties which serve to retard evolution.

Mr. Marconi had no sooner arrived in England than the whole machinery of obstruction was put into action. As scouts before the hostile army, there appeared a group of scientists, amongst them men of considerable attainments, who opened the attack by claiming priority for their own ideas. Others, including men of recognised prominence in the scientific world, contented themselves with disparaging the work of the newcomer, by repeating in public, wherever opportunity allowed, either that Marconi had made no scientific advance or that "what the Italian scientist had really done was to increase the distance . . . the basic facts having been known even to the ancients." Nowhere outside the little group that stood by Marconi during his early tests under Post Office observation is there evidence of support for the new development by scientific circles or the public. On the contrary, quite early in 1897 there were indications of underground activities by vested interests, which were more concerned with "damning with faint praise" than in seeing how far the new discoveries might be utilised to their benefit. The lay Press, which then seemed so inadequately equipped for dealing with scientific matters and frightened possibly by the attitude of English scientific opinion generally, left all initiative to its letter writers, but to its credit did not adopt the persistently hostile attitude of many technical papers.

That an almost complete paralysis of expression had been created by Mr. Marconi's surprising inventions is evidenced by the fact that some of the public organs which did enter into the realm of controversy

succeeded sooner or later in contradicting themselves. In 1897, for instance, the Post Office was being abused for spending public money in investigating "a young foreigner's" inventions to the neglect of home research; in 1900, when certain possibilities of "wireless" were beyond dispute, the same British Government was verbally castigated for having "fought shy" of the invention.

One factor which undoubtedly irritated and perplexed hostile interests, and actually formed the subject of hostile criticism in the technical Press, was Mr. Marconi's discreet silence. There is no doubt that certain of these organs had formed the opinion that young Marconi was a quack, and, having acquired this conviction, had expected him to push his wares in the manner common to that fraternity. But no such thing happened; and, whilst the critics of the new telegraphy were putting up what we can now describe as a barrage against public opinion, the young inventor tantalisingly went on quietly with his research. All efforts at discouragement were but as waves beating upon a rock. Well away from this hostile criticism, in the quiet retreat of Poole harbour and on craft sailing off the coasts of Hampshire and Dorset, Mr. Marconi was systematically engaged in piercing the veil surrounding etheric phenomena.

From time to time there would appear a terse paragraph showing that the range of wireless intercommunication was gradually increasing—one day an intervening distance of 12 miles had been spanned, in March, 1899, the English Channel had been bridged between Wimereux and the South Foreland Lighthouse, in July of the same year three British battleships managed to interchange messages at distances up to 74 nautical miles; so the magic circle spread in diameter.

By 1900 the critics were more or less resigned to the fact that radiotelegraphy in some form or another was certain to play a permanent part in marine intercommunication.

In February, 1901, a Liverpool journal referred to "wireless" as a "lusty and vigorous infant," and following the transmission of messages in the same month over the 200 miles separating St. Catherine's Point from the Lizard there was a pronounced burst of newspaper interest. An enterprising and somewhat daring reporter, however, who ventured to invite the opinion of the Director of a cable company upon the possibility of "wirelessing" from Britain to America, obtained the admission that there was no finality in things electrical, but that great difficulty could be foreseen in mooring ship relay stations at intervals across the Atlantic.

Here, perhaps, the sequence of events has been broken. Transatlantic "wireless" appears to have first caught public fancy in January, 1901, when, following the appearance of a paragraph in a London daily to the effect that the Marconi Company had purchased land at Mullion, in Cornwall, and were "maintaining such secrecy that even the former proprietor was not admitted to the premises," there instantly arose fantastic stories of Atlantic "cablegrams" at $\frac{1}{2}$ d. per word. Simultaneously there was opened a speculative controversy upon the prospects of establishing wireless communication with the Martians, a journalistic toboggan from the sublime to the ridiculous, and some budding mathematician, basing his calculations on existing data respecting heights of aërials and distances traversed, discovered

that such intercommunication, if possible, might be accomplished with aërials suspended from masts 3,400 miles high.

That Transatlantic signalling was really Mr. Marconi's objective in the construction of the Poldhu station was a well-kept secret, and, although certain newspapers managed to obtain interviews with the inventor during 1901, no one seemed to have taken seriously any such prospect. A Liverpool newspaper, again very much on the *qui vive*, managed to buttonhole Mr. Marconi in Liverpool one day in November, 1901, and to announce next morning that "Mr. Marconi will be a passenger to-day by the Allan liner *Carthaginian*. . . . He is going out for the purpose of installing a wireless telegraph station on the Newfoundland coast." Then followed some details regarding a chain of stations which Mr. Marconi had in his mind for Newfoundland and the Canadian coast. Needless to state this chain, so far as Mr. Marconi's immediate intentions were concerned, was pure camouflage.

SEVENTEEN YEARS AGO.

There is no need to detail again the epoch-making events of December 12 and 13, 1901, how the "S" signals sent out from Poldhu between 3 and 6 p.m. Greenwich time were unmistakably heard at St. Johns. The story has been repeated often since that memorable date. Of interest here rather are the impressions which were then created throughout the world. Few were prepared to unreservedly admit the probability of the accomplishment, some were sporting enough to reserve judgment until further details were to hand, and others sought far and wide for "other explanations" of the sounds which Mr. Marconi claimed to have heard. A prominent cable expert frankly unburdened himself of the statement: "In the first place I don't believe it," afterwards suggesting that his scepticism was based on "our own cable tricks." Another "interested," or, shall we say, "disinterested," expert, whilst admitting that signals may have actually been sent across the 1,800 miles of ocean, volunteered the assurance that the "system will never have commercial value."

Sufficient has been here given of the lesser known early history of "wireless" to indicate the weight which was thrown against the new development, until such a time that certain romantic happenings converted the lay public to the opinion that "wireless" was of real importance in many fields of activity. The most unsatisfactory feature of such opposition as prevailed into later years, particularly in the light of present events, is that some of the opponents of radio-telegraphy, when they found the method of direct attack was unsuccessful, did not hesitate to display an interest in rival systems, even to the extent of boosting apparatus "made in Germany."

Had it not been for the dogged persistence of a few who realised the national importance of retaining for Great Britain the prime interest in Mr. Marconi's patents, this country at the outbreak of war might have discovered itself to be absolutely at the mercy of an enemy organisation, dependent possibly on enemy factories for supplies of materials and replacements, and generally, what is known in common parlance as "in the cart."

If, therefore, in the speculations which follow some demand is made upon the imagination and suggestions are made which on the

surface appear fantastic and unpractical, and even inconsistent with present-day scientific knowledge, the history of Marconi's earlier struggles should be kept in mind. At this point, too, would we press home the need at all times for an open mind and a willingness to "test out" the claims brought forward by young experimenters. In the inevitable economic struggle which will follow this war the Anglo-Saxon peoples must not leave anything to chance.

LOOKING AHEAD.

There is certain to be a vast extension of the application of "wireless" to ordinary commercial purposes. Development of the means of communication is essential wherever civilisation and commercial activities hope to make progress. If "wireless" so far has not supplanted the expensive transocean cable, this is no indication that it may not augment the latter over many routes where cables now exist, and prevent the sinking of needless capital in places which, although requiring rapid development, have not yet adequate means of intercourse with the outside world. There are not a few who cling to the belief that cables and "wireless" have distinct fields of utility, but in other quarters young men, whose foresight has earned respect, see the day approaching when, as the cables deteriorate, they will be scrapped in favour of nature's great conductor—the ether. Any further development of the submarine for destructive purposes may also militate against submarine telegraphs and favour the system "sans fils."

Perhaps a sign of the times is provided in the announcement that a French transocean cable company has definitely decided to erect a wireless station for the conduct of uninterrupted communication between France and the United States. Those who are best informed upon recent progress in commercial "wireless" feel certain that this enterprise will be rewarded to a degree far beyond that company's expectations. Germany, which is making no secret of her thankfulness for the wireless service conducted by her high-power station at Nauen, openly expects this station to be her sole direct means of communication with the outer world for some period after the war.

It is stated in well-informed circles that certain cable companies possessing systems extending round the greater part of the globe are now engaged upon experiments for eliminating the relay of messages by intermediate stations. It is not improbable, however, that cable telegraphy, with its start of sixty years over the "stripling" wireless, may be overtaken, if not outpaced, by its youthful rival before the world has seriously settled down again to conditions of peace. During 1917 a wireless operator at Invercargill, New Zealand, found no difficulty in reading messages transmitted from the Eiffel Tower in Paris and Coltano, near the Italian Riviera. The signals from the Eiffel Tower were so strong that they could easily be copied upon a typewriter. We all know that there is a great difference between the technique of receiving messages under laboratory or test-room conditions and the interchange of signals under the exacting commercial demands for speed and accuracy, but the wireless engineer who keeps before him the glorious record of the past twenty years is certain of the future. We venture to state that, if the opportunity is provided for such enterprise, wireless

stations will be erected within the next five or ten years which will be able to communicate direct and under commercial conditions with places as far distant as London and Melbourne. With stations of such power and range suitably placed over the world no ship need ever be out of reach.

The fascinating subject of long-distance wireless telegraphy deserves more space than can be given in the present instance. Whilst the exigencies of warfare have necessitated the suspension of the long-distance commercial services, such as those which were existing between Britain and North America, the United States and Japan, the daily, and one might say almost hourly, issue in this country, under the caption "*Admiralty per Wireless Press*," of wireless news received instantaneously from (in these days) such telegraphically remote countries as Russia, Rumania, and Turkey, must suggest to many the possibility of further development along the same line. The peace time dissemination by wireless of international information is a matter to which all Governments must give early attention.

We do not refer so much to the radiation of domestic and social news as to the political news of such great importance in the creation of a better understanding between nations. The belief is growing in many quarters that the abolition of secret treaties would largely prevent a repetition of the horrible events which we are at present witnessing. If this be so, then the next most useful factor in this direction would be the general circulation, unabridged, of all political news having international bearing, a procedure which hitherto has not been practised owing to the enormous cost. Even the most powerful news agencies have to limit the amount of their international news to a degree which guarantees them against financial loss, and this means that to a considerable extent the news sent telegraphically from one country to another is inversely proportional in amount and detail to the distance over which it has to travel. Now, with one or more high-powered stations in each land engaged at fixed periods of the day in radiating the most important political news available in the several Government departments, half the world might be reached at the cost of sending a single long-distance cablegram, for it has to be remembered that wireless, unlike cable telegraphy, radiates practically in a circle—unless special arrangements are made to the contrary—and that the same message as might be recorded in America would be simultaneously received in Asia and Africa and all the intervening countries of Europe.

That development upon some such lines is certain is indicated by the fact that the Russian revolutionaries have decided that a chain of wireless stations is necessary for the satisfactory peace development of Russia. Germany, who realised the possibilities of wireless propaganda quite early in the war, may be relied upon to make full use of the etheric medium in times of peace, and it is inconceivable that she should be left unchallenged in advertising herself before the world.

THE WIRELESS TELEPHONE.

But in discussing the wireless distribution of public information we must not overlook the wireless telephone.

Although a state of war has possibly hindered the development of wireless telephony in those countries most intimate with its possi-

bilities, the fact remains that wireless telephony over distances even transocean in extent has already been accomplished. Speech so transmitted very nearly approaches the technical quality of direct conversation. All the vocal inflexions are faithfully reproduced.

There appears to be no serious reason why, before we are many years older, politicians speaking, say, in Parliament, should not be heard simultaneously by wireless in the reporting room of every newspaper office in the United Kingdom. It might be necessary, of course, that each speaker addressed the House from one recognised position, and that around the speaker, as in the case of the existing electrophone, there should be a series of microphones directly connected with a central transmitting station, but our politicians, always alive to the opportunities for publicity, would certainly overlook such technical trifles. Each newspaper office would have its own aerial, receiving gear, and telephones, which would be worn by the reporter detailed to make the notes. The receiving 'phones could be duplicated in order to avoid any break in continuity during the relays.

The field of the wireless telephone, however, is by no means restricted to newspaper work. The same idea might be extended to make possible the correct reproduction in all private residences of Albert Hall or Queen's Hall concerts or the important recitals at the lesser rendezvous of the musical world. That these suggestions are no mere flights of imagination is revealed in the fact that on one occasion at least within the last twelve months a dance was held in the United States to the strains of music transmitted by wireless from an orchestra several miles away.

AUDIBLE ADVERTISEMENTS.

Such departures would expose us, of course, to all sorts of logical but unwelcome developments. There would be no technical difficulty in the way of an enterprising advertisement agency arranging for the interval in the musical programme to be filled with audible advertisements, pathetic or forcible appeals—in appropriate tones—on behalf of somebody's soap or tomato ketchup. Even to-day the departments of food economy and War Savings might provide periodic stentorian exhortations by wirelessly operated megaphones established at the traffic centres. The experiment would have the advantage of protection by the Defence of the Realm Act.

'TWIXT EARTH AND HEAVEN.

The present war has demonstrated very clearly the certainty of still further extraordinary advances in mechanical flight. Military requirements have sufficiently revealed the possibility of constructing aeroplanes capable of carrying considerable loads over very long distances. In the intensive commercial life which will be thrust upon us to make good the ravages of the present conflict there will certainly arise a need for such speedy long-distance transit as the aeroplane alone can afford. There are many persons, theatrical managers, for instance, to whom a non-stop Transatlantic flight, costly though it might be, would be a profitable adventure even from the point of view of the value of time saved. One of the essentials for long-distance aerial traffic will be a complete wireless system enabling the aeroplane

to keep in touch with mundane affairs throughout the journey, and to signal in turn to stations below as the journey progresses. We can imagine the value of wireless to an aeroplane setting out, say, from London to Vladivostock, which, on approaching the Urals, learns of a violent storm travelling westwards from Siberia. How useful, too, would wireless be if that same machine, crossing the inhospitable wastes of Siberia, and compelled to land at some out of the way spot, could give to the nearest land station an indication of its predicament.

Such a wireless equipment operated in conjunction with a systematic arrangement of stations on *terra firma* would enable the pilot to maintain his course even above a sea of low-lying clouds. Aerial navigation under such conditions would be relatively independent of the weather.

By the same system of relays there should be no great difficulty in the way of a commercial magnate, riding at two or three hundred miles per hour above the Pyramids of Egypt or the hilltop monasteries of Thibet, receiving the latest Stock Exchange news and giving thereon his directions to his brokers. In those days, not so very far distant, we shall have something approaching hustled history.

Even treating aviation as a sport, and the military requirements of the future will demand for it even wider recognition and support than has been given in the past to fox-hunting and steeplechasing, there will be an imperative need for some system of wireless warnings if the fickle atmospheric conditions of this country are not to claim an undue number of lives. It should not be at all difficult to standardise means for conveying such information to cross-country fliers. Each aerodrome—and there will be hundreds constructed throughout the kingdom—must have its wireless signal station operating in conjunction with a local weather bureau.

This same forced growth of aerial activity will undoubtedly stimulate research into weather conditions. For several years wireless has played a useful part in the quest for meteorological information, much of the most valuable data on the charts issued by the meteorological offices of the several Governments having been received from ships at sea. Some day, when the organisation is sufficiently well advanced, we shall have all big farmers placing themselves in wireless touch with the meteorological office by installing a special receiving apparatus. Much valuable time would be saved even to-day by a wider and simultaneous dissemination of weather warnings. This, of course, especially applies to farming in the colonies and to planting in semi-tropical climates.

Already there are in existence marine "danger signals" operated under wireless control. As far as we can see there is certainly no reason why many lighthouses, which are little more than prisons for the devoted watchers, should not be controlled from the shore by impulses radiated at sundown and sunrise and at such times as storms break over the neighbourhood. Instead of many groups of watchers there would then be need only for an inspecting staff which would pay periodic visits to refill the gas containers and make any necessary adjustments. When more is known about the utilisation of wave and tidal power, the need for constant attention to the source of light will also disappear.

In any case, should it be deemed advisable to maintain lighthouse crews at many of the most exposed positions, there is very good reason for establishing wireless intercommunication with the nearest coast station. Not only would life be made more tolerable to the men on the rocks but warnings might be exchanged of considerable value to navigators.

IN THE BACKWOODS.

Whilst it is already obvious that great expanses of territory, like the continents of Africa, Asia, and South America, provide almost unlimited scope for wireless intercommunication, it is probably not so well known that the actual surveying of those countries can be undertaken to a wonderful degree of accuracy by "wireless" means. By a very simple application of the wireless direction-finder it is possible to triangulate vast areas of territory at a speed quite impossible by any other present method.

One of the great factors which will materially assist to popularise wireless for pioneering, prospecting, or even Polar exploration is the wonderful degree of portability now reached by the employment of more sensitive receiving gear. Apparatus capable of reliably transmitting from 50 to 75 miles has been constructed with a total weight of not more than 10 lbs., whilst practical sets suitable for transmitting messages from 10 to 20 miles have been produced, having a total weight of 5 lbs. Pocket wireless only exists so far in the minds of the writers of thrilling spy stories, but the day is very near at hand when light portable sets might be introduced for a variety of useful purposes. Two special applications from that progressive country, the United States of America, may particularly appeal to British authorities.

During the rainy season in Southern California great havoc is often wrought in the matter of a few hours by streams washing away bridges and flooding roads, and thereby interrupting vital communications. In order to ascertain the conditions of the highway and secure their immediate repair, the responsible authority have mounted a portable wireless outfit of considerable range on a motor lorry, capable of carrying the apparatus and fifteen men at a speed of 30 miles per hour. Immediately a serious "fault" in the highway is discovered light aërials are run up and the fact notified to headquarters. On advice from headquarters that the situation is appreciated, and preparations have been made for a breakdown gang, the "Trouble Hunters" pack up their wireless and continue their tour.

The New York police possess motor vans equipped with wireless which enable them to keep in touch with headquarters when engaged upon any task requiring constant intercommunication. The New York river police also have wireless installations on their patrol boats, and this, we are informed, has wonderfully facilitated the work of defeating the designs of enemy agents in that vast network of waterways known as New York harbour. We are surprised that greater use has not been made of wireless for police and fire service on the Thames and at other ports in the United Kingdom.

A few years ago a romantic touch was given to a successful piece of criminal investigation by the use of wireless for the tracking down of the murderer Crippen. The conditions were such, however, that the criminal's identity was practically established on the descriptions

wirelessly to the liner by the Scotland Yard officials. The wireless transmission of photographs is by no means outside the realm of possibility, and some day, not very far distant, it may be possible to provide not merely wirelessly operated tape-machines in mid-Atlantic but pictures illustrative of the days' events. The nightmare of wireless television is unlikely to become a reality for some time. Mechanical and electrical difficulties exist which require for their solution a much more complete knowledge of the nature of light, electricity, and ether. Some day the solution may be forthcoming, but, as such an invention would be of questionable popularity and its commercial application limited, the inventive faculties in most countries are likely for the present to be turned in other directions.

Late in the autumn the lay world was surprised by an Admiralty announcement of an attack upon British ships by an electrically controlled boat. The device, it subsequently appeared, was an elaboration of one brought to the notice of the British Admiralty many years ago, the only new feature being that the control of the craft was directed in the first instance by wireless from a naval aeroplane. The Press undoubtedly were on the safe side in regarding the idea as somewhat clumsy in conception and doomed to failure, particularly as we sank the newcomer and the newcomer did not sink our ships. The wireless control of torpedoes and similar devices is a fascinating problem which has received the attention of quite a number of imaginative persons. The contributions made by Englishmen, however, for some inexplicable reason have always been given less publicity here than the experiments of foreigners. Wireless control of this character has been demonstrated in the case of models, or over limited distances, for some years past, but any serious development beyond the experimental stage has always been hampered by the difficulty that it is obviously impossible to control to any effect an object outside the range of vision. The rapid progress of aviation and the equipment of aeroplanes with radio apparatus introduce quite a new factor into distant control and suggest a wide field for wireless in the warfare of the future. One can foresee new horrors, such as the ignition by wireless from aeroplanes of land mines buried prior to an evacuation or a retreat and the wireless release of poison gas from buried containers.

When nature's wide use of "wireless" is reflected upon, one is tempted to wonder whether as our knowledge of the ether progresses some means may not be discovered of transmitting "power" without the use of metallic conductors. At present, of course, only an infinitesimal portion of the power utilised in sending wireless signals is intercepted at distant receiving stations, and with our existing data it does not appear likely that the actual transference of energy without hopelessly high losses on the way is at all possible—but—; what did our greatest physicists think of the prospects of wireless telegraphy less than a quarter of a century ago?

A WIDE FIELD FOR YOUNG ANGLO-SAXONS.

If we have exposed ourselves to the charge of tedium in this review of "possibilities," the risk has been taken in order to indicate not only the wonderful scope for wireless research but something of the field opened to wireless engineering. Until now the man in the

street has been so entertained by the romantic results attained by wireless at sea that we suspect he has given but little thought to the activities behind the scenes in physical laboratories, drawing offices and workshops which have made possible such gratifying successes.

Behind the many thousands of Marconi operators who bravely face grave risks in the privileged task of protecting human life are large groups of men working silently, but none the less enthusiastically, on the solution of etheric problems and the construction of wireless apparatus. It is of direct interest to the English-speaking peoples, with their gigantic naval and mercantile fleets and world-wide territory, and also to the progress of civilisation, that this ever-growing army of wireless workers should draw to its ranks from amongst these peoples ever-increasing numbers of young men of ability and genius, men with open minds and the most liberal education the respective countries can bestow. It is to be hoped that the great technical institutes and the public schools which display a pride in their modern side will appreciate at once the prospects of wireless engineering as a career, and bring to the notice of those best in a position to judge such students as display talents likely to assist in extending the field of radio control.

S O S

AN OUTLINE SKETCH OF WIRELESS ACHIEVEMENTS IN LIFE SAVING AT SEA.

By H. J. B. WARD, B.A.

IF ever (to quote the words of Emerson) a man "built better than he knew," that man is Marconi. When the young Italian first came to England aflame with his new invention he could never, for all his enthusiasm, have had any conception of the magnitude of his own achievement. Only in the year of grace nineteen hundred and eighteen are we on the threshold of such realisation.

Since the start of the present war, by Orders in Council issued under the Defence of the Realm Act, British ships of 1,600 tons and over have been called upon to instal wireless telegraphy; and many other countries with mercantile fleets have instituted legislation on similar lines. Such steps are the result of practical experience, and few people unacquainted with the manners and methods of officialdom can realise the overwhelming nature of the evidence which is necessary before sufficient pressure can be brought to bear for the initiation of such steps. Had matters been otherwise, the recommendations of the Safety of Life at Sea Conference of 1914 would have remained a dead letter. Many private shipowners showed their appreciation of radio-telegraphic service years ago, and Lord Joicey, when presiding at the annual meeting of the North of England Steamship Owners' Association, held in the course of 1917, emphasised the fact that shipowners had joined hands with the Newcastle education authorities to establish a school of wireless telegraphy in that Northumbrian port, with the object of training lads for service as wireless operators at sea. The importance of the subject is, therefore, attested by governments and by mercantile *entrepreneurs*. And the same verdict is pronounced by those who follow the sea as a career. The Mercantile Marine Service Association, which represents them, and which has done magnificent work on their behalf all through the present period of stress, has (to use the phraseology of their own recent report) "frequently urged the enactment of legislation to enforce any measure calculated to reduce loss of life at sea; advocating, amongst other things, (a) the carrying of life-saving rafts, (b) the installation of wireless telegraphy, and (c) the fitting of crow's nests on all vessels." Could any branch of human activities pronounce a more unanimous verdict than has been thus passed in favour of the extension of wireless telegraphy at sea?

The list of timely rescues, which figure in the following pages, are necessarily, in the present state of affairs, incomplete; but they, at all events, furnish a body of evidence quite overwhelming in its general tendency. Moreover, they provide our readers with almost inex-

haustible material for the exercise of what we may term the pictorial side of mentality.

*Mental
Pictures.*

As an example of what we mean, let us take some instance selected at random from the list.

Suppose that our choice has fallen on (say) the entry against December 25th, 1916. The text runs "s.s. *Maitai*, stranded on Coral Reef at

"Rarotonga, whilst discharging cargo; wireless summoned aid from "Papeete, all on board saved and most of cargo." Give your imagination free play, and you will call up a mental image of a scene set in the lovely climate of the South Pacific. You will visualise a New Zealand liner parting from her cables and stranding, ere she can get steerage way, on one of the coral reefs which fringe these charming islands. Let us transport ourselves on board, and try to realise the helpless condition in which everyone there must find themselves. Their ocean home lies close to the palm-fringed shore, but cut off therefrom by a line of breakers, through which it is difficult for any but native boats under the most skilful handling to make their way. Meantime the vessel is grinding against the cruel sharp teeth of coral ridges. The captain directs the wireless operator to summon aid. Messages are radiated and a response at length obtained from Papeete, a French radio station in Tahiti, about 600 miles away. A relief steamer is promptly despatched, and salvage operations carried out with much success. Such is a brief outline of our mental pictures, inspired by the dry tabulated summary in our list. As a matter of fact, the present writer had the privilege of reading the full account, sent home by the wireless operator himself. It exactly tallies with the sketch indicated above. It details the difficulties which had to be surmounted, due in part to the long distance dividing the ship station from Tahiti, and in part to the "atmospherics" which (as wireless men men know all too well) are so prevalent in the South Sea regions. "To add to my troubles," says the young telegraphist, "the distracting noises caused by the engines and winches of the ship, combined with the harsh grinding of the vessel's keel upon the reef, made my task one of unusual difficulty." The wireless report proceeds to tell us that the ship's apparatus was kept at work all through the period which elapsed between the stranding of the vessel and her final abandonment. The friends and relatives of passengers and the "belongings" of the ship's *personnel* had to be informed of their individual safety. The owners of both vessel and cargo were maintained in constant touch with the progress of salvage.

It will be noticed that the incidents which figure amongst our "Timely Rescues" may be classified under certain general heads. Such a classification was attempted in the introductory remarks which precede the list as given in our 1917 issue. To that volume we must refer our readers for them.* Our attention was, however, recently arrested by the account printed in a current magazine, which admirably illustrates the way in which wireless "shepherds" a vessel from the start of its voyage to the finish. That account bears so directly upon our subject that it appears apposite to quote it here.

*Shepherding
a Vessel
Throughout
its Voyage.*

The *Noordam*, owned by the Holland-America Line, left New York on July 11th, 1917, for Rotterdam. After clearance papers had been quickly obtained, some delay arose on account of the extension of British minefields in the North Sea. Eventually, trusting in the favourable issue of negotiations which were going on with regard to the opening of a new safe thoroughfare, and con-

* Page 711 of "Year-Book, 1917."

vinced that he would get timely wireless warning of the arrangements made, the captain decided to push on. Knowing that exact navigation was compulsory, he ordered the chronometers to be rigidly controlled by the wireless time signals daily provided through the long-distance stations at Paris and Washington. About 450 miles out, they received a communication from the wireless coast station at Bergen, in Norway, indicating the area of the new minefields and advising them that the lightships would be moved to fresh positions, so as to indicate the revised free passage. These readjustments of lightship positions were also mentioned in the message. On the following night the Scheveningen long-distance station, working at a distance of 500 miles, confirmed this information, and asked them to relay the particulars to the s.s. *Zyldyk*. At this point the captain remarks: "Seeing that the *Zyldyk* is not fitted with wireless, we were unable to do so."

The following morning Scheveningen spoke again, giving full details of the new lightship positions, and advising them that the tug *Thames* would await them near the North Dogger Bank. As the latter tug was fitted with wireless, they were to get into communication with her, a procedure which "proved to be of the greatest utility to us in finding the rendezvous," says the captain. They met the *Thames*, and passed the Southern Dogger Bank Lightship together. Supplementary information and directions reached them, also by wireless, from the lightships. At 3 p.m. the *Noordam* struck a mine; and, as the ship was taking in much water, the captain ordered the radiation of the distress call. Ere two hours had elapsed, torpedo boats turned up in response thereto. And so the *Noordam* passed along, constantly interchanging messages with the vessels standing by her. In the end the stricken ship was successfully salvaged, and anchored off the Hook of Holland. Direct communication as to the state of affairs, from hour to hour, was established with the shipowners through the intermediary of the radio stations at Scheveningen and Nieuwediep, and the naval commander of the latter station supervised, through the same medium, the assistance which was rendered.

An extremely satisfactory result of this constant intercommunication was to give the shipowners and consignees an opportunity of having all the necessary unloading machinery and labour ready to start the moment the vessel was in position. It enabled the consignees, moreover, to ensure the promptest possible reception of their goods. The economy thus effected can only be adequately appreciated by those engaged in the business of commerce overseas.

The final paragraph in the above account summarised from the wireless report of the *Noordam*, touches upon a point in connection with the fitting of wireless on sea-going vessels which is quite irrespective of any actual rescue. The unique British shipping institution known as Lloyd's, founded originally for the protection of the underwriters of vessels and their cargoes, has become of vital importance also to everyone connected with the sea. Their organisation of signal stations, and their network of communication, are highly advantageous to shipowners and merchants and the commerce of the

*Future
Possibilities.*

world in general. Wireless has rendered possible an enormous extension of this plexus of communication, and Lloyd's are already making abundant use of it.

But greater possibilities are open in the future. These possibilities have not escaped the observation of our mortal enemies, and the fact that the British institution has become world-wide and international is, of course, gall and wormwood to them. At the beginning of June, 1917, a meeting was held in Hamburg, whereat the notorious Dr. Brueders of Berlin put forward a proposal for the post-war establishment of a German Lloyd's, laying special emphasis upon the essentiality of Germany's employing radiotelegraphy on a much more extensive scale than ever before, besides taking immediate steps to render the Fatherland completely independent so far as cables are concerned. This project is intended to form part and parcel of the gigantic efforts which our enemy hopes to be able to initiate the moment that the British Fleet "ceases from troubling," and the ocean trade-routes are once more available for the black, white, and red ensign which has been absent from them since 1914.

The text of the Bill for the Restoration of the German Mercantile Marine was published in Berlin on July 10th of the same year, and a pretty comprehensive measure it appears to be. Let us hope that "forewarned is forearmed," and that British shipowners and the British

*German Projects
for Mercantile
Expansion.*

Government, to say nothing of Lloyd's, will have their plans cut and dried to meet the competition. Embodied in the Teutonic scheme, we find the intention that Germans should have at their disposal so extraordinarily elaborate system of radiotelegraphy that shipowners will not merely be able to assure themselves of the safety and position of each vessel at any time, but will, simultaneously with the masters of their vessels, be kept closely in touch with the state of the markets, the prices ruling, the demand for tonnage, and other important details affecting the individual voyage of each ship. The shore agents engaged in transmitting such information are to have the opportunity in every case of knowing, through the medium of wireless, exactly not only at what date, but at what hour the vessels may be expected, so as to make arrangements for immediate berthing and unloading, as well as for transference of the ship's cargo to railways or other media of distribution ashore.

To return to our list. It will doubtless not have escaped the observation of our readers that the recent cases of rescue work effected through the medium of wireless present many *lacunæ*. This must be laid mainly at the door of the exigencies of the times; when censorship

*Unrecorded
Exploits of
Wireless.*

cannot, in the national interests, permit a number of instances to be publicly reported. Especially does this hold true in the case of transports. Yet wireless has a large number of instances of such a character to place to its credit. We may give, as a type, the torpedoing of the troopship *Ivernia* in the Mediterranean Sea on New Year's Day 1917. This is especially worthy of reference here, because it exemplifies the way in which the use of wireless facilitates rescue work, even apart from the actual summoning of the rescuers. An account was permitted to appear in the Press, wherein

Lieut. S. Hall, an officer of the Macclesfield Territorial Battalion of the Cheshire Regiment, draws a graphic picture of the occurrence. The gallant officer appears to have been enjoying a game of deck-quoits when "a tell-tale line of bubbles and foam came directly towards us." He had the misfortune to form one of the party in a boat which was unsatisfactorily launched, and all of whose occupants were pitched headlong into the sea. As soon as he "came to the surface and got the water out of his eyes," he found that he was being swept rapidly past the *Ivernia*; but was ultimately pulled on to a raft, where for a few minutes he suffered from violent sickness as a result of the salt water he had swallowed. The SOS signals, which had been radiated from the transport's aerials, summoned to their assistance a number of trawlers, which had passed them earlier in the morning, as well as various vessels of war. The troops who had not been able to get away on the boats or rafts, and who crowded the decks of the stricken liner, owed their safety to the good seamanship displayed and the promptitude with which wireless had got into touch with the rescuers. After their more pressing needs had been served came the turn of those upon the rafts, and Lieut. Hall describes the heartfelt relief of himself and his companions at the conclusion of their four hours of anxious vigil.

The same factor in the use of wireless is illustrated in the case of the salvage of the Greek steamer *Athamas*, and the valuable cargo of 7,000 tons of grain which she was carrying for the Belgian Relief Committee. In the course of the trial, which took place before Mr. Justice Hill, Lieut. Worley, R.N.R., of H.M.S. *Resono*, narrated how his ship had just rescued 22 of the crew of a mined Norwegian steamer when he heard a violent explosion, and saw clouds of smoke rising from the Greek relief ship. Forty members of the crew of the *Athamas* were picked up by our English sailors, and—as these men refused to return to their vessel—and the captain of the British warship already had his hands full with the Norwegians just rescued—he sent out wireless messages asking for further assistance. These messages brought the desired aid. With their help Lieut. Worley was able to prevent the *Athamas* from drifting into the German mine field, and carried her safely into port. The following morning the gallant Britishers set to work and swept up the German mines floating in the neighbourhood. The amount of £3,500 was duly awarded by Mr. Justice Hill, and divided in the following manner: *Resono*, £550; *Electra*, £750; *Fervent*, £400; *Seaflower*, £400; *Sicyon*, £300; *Marloes*, £100; *Croupier*, £450; Torpedo Boat N. 9, £200; *Robust*, £350.

The above two instances show the wideness of spread which constitutes so marked a feature of the wireless net. Would-be rescuers have to be informed of the number of boats and rafts which have put out from the vessel in distress, and (as we have just seen) it is often necessary to radiate the information in their turn to other vessels within touch, in order to supplement their own efforts and to make certain that no one who can possibly be saved, is neglected. The number of vessels, between which Mr. Justice Hill's award of salvage money was shared, demonstrates eloquently that a considerable batch of vessels may be affected by such calls.

In the early days of wireless telegraphy, when land stations were sparse in number, and the ships fitted were literally "few and far

between," wireless rescue operation, were necessarily less *en evidence*. We referred last year * to the fact that there is a two-years' gap between

The Future. the rescue of the *R. F. Matthews* in 1899 and the entry which follows it, that of the *Princess Clémentine*, on January 1st, 1901. To-day, thanks

to the largely increased number of ships fitted, the records come thick and fast, and only Press Censorship of a numerous section of such incidents renders the list possible for publication within our allotted space. In the future, when every vessel afloat considers an aerial as important as rigging or boilers, we shall find the year's record occupy more than the space at present covered by the whole survey. Every additional ship which is fitted can obviously communicate with all the others, and therefore increases the possibilities of communication not by one, but by a figure which does not deserve any epithet short of "vast."

Before passing on to the list which follows, our readers may be interested to have put before them a correct, though necessarily a brief, sketch of how the signal SOS came to be used, and what is implied by it. All sorts of fantastic explanations have been offered, and continue to be offered in the General Press.

*Meaning and
Method of the
"SOS."*

In the first place we may point out that the original call of distress was "CQD" (— . — . — — . — — . .). This was adapted from the use of the signal "CQ," an "all stations" call utilised in the telegraphic system of the Post Office, and adopted by cable and telegraphic services all over the world. Thus, for example, in the transmission of lengthy press telegrams it frequently happens that an identical message has to be despatched to several stations simultaneously. These stations are looped up with the transmitting centre, and instead of "calling" each station individually, the operator handling them simply makes the signal "CQ," meaning "all stations." Thus each and every station immediately gives attention and receives the message from the one transmission. A considerable economy in time is effected by following this course.

This sign for "All Stations" was adopted by wireless soon after it came into being, and whenever any wireless operator wanted to indicate that the sender was on a vessel in distress and requiring assistance, he added the letter "D" (distress) to indicate that fact. "CQD," therefore, meant "All Stations. Distress." This call was used for some years; and was, in fact, the signal employed conjointly with SOS for summoning the rescuers, when, on the fatal day of April 15th, 1912, the *Titanic* foundered through collision with an iceberg on her maiden voyage. It was this gigantic catastrophe which, more than anything else, directed world-wide attention towards the improvement of methods of using wireless for rescue work at sea. That attention, it will be remembered, culminated in the International "Safety of Life at Sea" Convention," concluded in London on January 20th, 1914. The text thereof figures on page 72 of this volume.

SOS, the later form of Distress Call, was initiated in 1906 at the Berlin Radiotelegraphic Conference, but was not universally adopted until the provisions arrived at by that Conference came into force—i.e., on July 1st,

* See "Wireless to the Rescue" page 711 of the 1917 Year Book.

1908. This signal was adopted simply on account of its easy radiation and its unmistakable character. *There is no special signification in the letters themselves, and it is entirely incorrect to put full stops between them.*

The method of procedure ruling at sea is that, as soon as the captain issues instructions to the operator to send out the distress call, he gives him the position of the ship, and this information is radiated, interspersed with the sign which it is the bounden duty of everyone to answer without delay, putting aside everything else in order to do it. This call for aid must, moreover, be passed on to others—in default of a request from the distressed ship not to do so. So soon, however, as communication has been established with a particular rescuer, the SOS radiator and this individual ship continue their intercourse, undisturbed by any message radiation from other vessels within reach, the latter standing by, listening-in, and promptly acting on the information obtained in this manner.

TIMELY RESCUES.

Date.	Name of Vessel.	Nature of Disaster.	Part Played by Wireless.
1899. March 3 ..	s.s. <i>R. F. Matthews</i>	Ran into East Goodwin Lightship during fog	Wireless message brought lifeboats from shore
1901. January 1 ..	s.s. <i>Princess Clementine</i>	Reported bark <i>Midora</i> waterlogged	Tug rescued the vessel in distress
1903. December 8 ..	s.s. <i>Kroonland</i> ..	Steering gear disabled 130 miles west of Fastnet	Crookhaven communicated with and arrangements made.
1904. —	s.s. <i>New York</i> and <i>Friesland</i>	Accidents reported ..	Arrangements made by radio
1907. —	s.s. <i>Preston</i> ..	Stranded on Courtowngays Island	Assistance brought
April 10 ..	s.s. <i>Arapahoe</i> ..	Lost propeller off Cape Henlopen, Delaware	<i>Apache</i> and <i>Iroquois</i> answered call and towed vessel to port
May 8 ..	s.s. <i>Prinz August Wilhelm</i>	Stranded Kingston, Jamaica	Aid secured by radio
1908. March 25 ..	s.s. <i>Seminole</i> ..	Stranded Point Pleasant, N.J., in fog	Salvage tugs summoned and crew saved
April 25 ..	British cruiser <i>Gladiator</i>	Sunk by s.s. <i>St. Paul</i> off Isle of Wight	Wireless used freely for rescue work
1909. January 20 ..	s.s. <i>Hamilton</i> ..	Collision with barge in Hampton Roads	Distress call brought tugs which towed vessel to port
January 23 ..	s.s. <i>Republic</i> ..	Rammed and sunk by s.s. <i>Florida</i> off Nantucket Lightship	Aid promptly summoned and 761 persons saved
February 26 ..	U.S. Revenue Cutter <i>Mohawk</i>	Stranded on Hog Back at Hell Gate	Tugs and lighters summoned
March 8 ..	s.s. <i>City of Racine</i> ..	Disabled in Lake Michigan	Radio calls saved 200 lives
March 10 ..	s.s. <i>Horatio Hall</i> ..	Rammed by <i>H. F. Dimock</i> off New England Coast	Rescuers summoned and all on board saved
June 10 ..	s.s. <i>Slavonia</i> ..	Stranded off Azores ..	Aid summoned and 410 lives saved
June 27 ..	s.s. <i>City of South Haven</i>	Rudder lost in heavy seas. .	Assistance secured and vessel towed to port. One hundred passengers on board
June 29 ..	s.s. <i>Mackinaw</i> ..	Grounded on Yukon Flats	Lighters summoned
August 11 ..	s.s. <i>Arapahoe</i> ..	Broke tail shaft near Diamond Shoals	<i>Huron</i> answered wireless call and assisted with repairs
August 14 ..	s.s. <i>Helen</i> ..	Grounded off Poplar Island, Chesapeake Bay	Vessel carried no wireless, but sighted by tug <i>Savage</i> . Latter's aerials brought necessary aid
August 27 ..	s.s. <i>Ohio</i> ..	Rammed and sunk off Alaska	Two hundred lives rescued through wireless
September 21..	s.s. <i>Caris</i> ..	Machinery disabled off Cape Hatteras	Wireless calls brought several ships and <i>Caris</i> towed to port
September 25..	s.s. <i>Zeeberg</i> ..	Stranded near Jacksonville, Fla.	s.s. <i>Arapahoe</i> saw distress signals and summoned aid by wireless
October 13 ..	s.s. <i>Georgia</i> ..	Lost propeller blades in heavy sea off Kewaunee, Wis.	Tug was summoned and towed <i>Georgia</i> to port
November 1 ..	s.s. <i>Alliance</i> ..	Lost rudder off Goose, Ore.	Tugs summoned and towed vessel to port
November 20..	s.s. <i>Breakwater</i> ..	Stranded near Diamond Shoals in heavy gale	Cape Hatteras Station received wireless call and sent tugs
November 22..	s.s. <i>Puritan</i> ..	Broke steering gear off Benton Harbour, Lake Michigan	Towing steamers summoned

Date.	Name of Vessel.	Nature of Disaster.	Part Played by Wireless.
1909.			
December 1 ..	s.s. <i>Nueces</i> ..	Grounded on French Reef, Florida	Key West Station brought <i>Lampasas</i> and Government tug
December 27 ..	s.s. <i>Iroquois</i> ..	Lost propeller north of Frying Pan Shoals	Calls answered by nine steamers and vessel towed into Charleston, S.C.
1910.			
January 3 ..	s.s. <i>Algonquin</i> ..	Broke tailshaft off Cape Hatteras in blizzard	Call answered by s.s. <i>Apache</i> , and vessel towed back to port
January 7 ..	s.s. <i>Arizona</i> ..	Disabled through explosion	Call brought out s.s. <i>Indiana</i> , which towed <i>Arizona</i> back to Chicago
February 5 ..	s.s. <i>Kentucky</i> ..	Sprang a leak, sank 210 miles East Charleston	Call answered by s.s. <i>Alamo</i> , which rescued crew
April 13 ..	s.s. <i>Santa Clara</i> ..	Foundered off Coast California	Wireless brought tug <i>Ranker</i> which saved 95 persons
May 9 ..	s.s. <i>Preston</i> ..	Lost propeller, rendered helpless	Wireless brought aid
July 20 ..	s.s. <i>Huallaga</i> ..	Burned at sea off Coast Peru	SOS answered by s.s. <i>Ucayali</i> which rescued all
July 23 ..	s.s. <i>Momus</i> ..	Caught fire south Cape Hatteras	Call brought s.s. <i>Comus</i> , which helped to save vessel
September 9 ..	<i>Pere Marquette Car Ferry</i> 18	Sank middle Lake Michigan	SOS received by Ludington Wireless Station and four passengers and two of crew rescued
September 21 ..	s.s. <i>Western States</i> ..	Disabled off Long Point, Lake Erie	Wireless summoned aid
October 18 ..	Wellman dirigible airship <i>America</i>	Helplessly drifting, Atlantic Ocean	R.M.S.P. <i>Trent</i> summoned, and rescued crew from airship
October 28 ..	s.s. <i>Charles Nelson</i> ..	Went ashore, North Point Arena, Calif., in thick fog	SOS brought U.S. Revenue Cutter <i>McCullough</i> to her assistance
December 1 ..	s.s. <i>North Western</i>	Wrecked off Falee Bay, Wash.	SOS brought s.s. <i>Tees</i> , and all on board saved
December 10 ..	s.s. <i>Olympic</i> , of Alaska S.S. Co.	Wrecked on reef off Bligh Island, Alaska	SOS brought Government launches and rescued 123 persons
1911.			
January 25 ..	s.s. <i>Queen</i> ..	Fire in forward hold while off Point Reyes, Calif.	SOS brought four steamers to her assistance, and 87 passengers and crew saved
January 26 ..	s.s. <i>Cottage City</i> ..	Wrecked off Quadra Island B.C.	SOS brought aid and all rescued
April 11 ..	s.s. <i>Asia</i> ..	Sank off Finger Rock, South China	Wireless calls brought <i>America Maru</i> and <i>Shang Suu</i> . All saved; also mails
May 12 ..	s.s. <i>Merida</i> ..	Rammed by s.s. <i>Admiral Farragut</i> ; sank off Diamond Shoals	All saved through wireless
June 15 ..	s.s. <i>Western States</i>	Disabled while in middle of Lake Erie	Wireless brought two vessels, and all passengers saved
November 22 ..	s.s. <i>Prinz Joachim</i> ..	Struck rocks at Atwoods Bay, Samana Islands	Wireless established direct, New York City. All saved
December 13 ..	s.s. <i>Delhi</i> ..	Stranded off Morocco Coast	Wireless answered; 86 passengers, 235 crew, 3,500 tons general cargo saved
1912.			
February 22 ..	s.s. <i>Madison</i> ..	Rammed by s.s. <i>Hippolyte Dumois</i>	Wireless used; all on board were saved
April ..	s.s. <i>Denver</i> ..	Collided with s.s. <i>El Sud</i> of Galveston Bar	Assistance summoned by <i>Denver's</i> calls, and <i>El Sud</i> towed into Galveston
April 15 ..	s.s. <i>Titanic</i> ..	Struck iceberg mid-Atlantic	SOS answered by s.s. <i>Carpathia</i> , which rescued 703 persons
August 16 ..	s.s. <i>Pleiades</i> ..	Ran ashore, Magdalena Bay	Aid summoned by wireless. All saved
October 19 ..	s.s. <i>Camino</i> ..	Dropped her propeller ten miles off Astoria	SOS answered by s.s. <i>Watson</i> , and vessel towed safely to port

Date.	Name of Vessel.	Nature of Disaster.	Part Played by Wireless.
1912. December 5 ..	s.s. <i>Easton</i> , U.S. and Dominion Transportation Co.	Struck Iroquois Reef, Lake Superior	Wireless answered by stations at Port Arthur, Ont., and Duluth, Minn., and tugs sent.
No date ..	s.s. <i>Advance</i> ..	Pilot house and bridge torn away	SOS brought assistance from three liners
1913. January 7 ..	s.s. <i>Rosecrans</i> ..	Wrecked off Pacific Coast ..	SOS sent out, 1 saved, 38 lost
January 16 ..	s.s. <i>Veronese</i> ..	Wrecked at entrance to Leixões Harbour	SOS sent out and all but few were rescued
February 14 ..	Cargo schooner, <i>Frank B. Wilherbee</i>	Badly damaged	SOS signal responded to by <i>Itasca</i> . All saved and vessel safely towed to Boston Harbour
March 21 ..	The <i>Texas</i>	Bound from Christiansand to Galveston, lost propeller in heavy sea	Wireless answered by C. F. Tietgen, of Scandinavian-American Line, which effected successful rescue
April	The <i>Robert Dollar</i> ..	En route from U.S.A. to Japan; her stern post and rudder broke off, leaving her helpless in heavy sea and high wind	Communication established with shore, and tug sent to assistance
June 10 ..	s.s. <i>Olinda</i>	Caught fire at sea	SOS brought U.S.S. <i>Nashville</i> to assistance of vessel
June 13 ..	s.s. <i>Yukon</i>	Struck reef off Alaskan Coast and sank	Aid summoned by wireless, and all saved
June 19 ..	s.s. <i>Riverside</i> ..	Wrecked and sank off California Coast	Wireless used; all saved
July 24 ..	<i>Millinocket</i> ..	Collision with <i>Persian</i> ..	Tug and lighter summoned by wireless; vessel successfully docked
August 18 ..	s.s. <i>State of California</i>	Crashed into reef in Gambier Bay, Alaska, and sank within three minutes	<i>Jefferson</i> , of Alaska S.S. Co., answered call, and saved 70 out of 103 on board
September 30..	s.s. <i>Templemore</i> ..	Caught fire 800 miles off American Coast	Fifty-four saved
October 3 ..	<i>Spokane</i>	Went ashore on beach off Cape Lazo, B.C.	Wireless summoned four vessels, <i>La Touche</i> picked up survivors from the lifeboats
October 10 ..	s.s. <i>Volturno</i> ..	Burned 1,000 miles west of Ireland	Wireless answered by eleven vessels; 521 lives saved
October 15 ..	<i>Merced</i>	Destroyed; wrecked off Point Gorda, Calif.	Three ships replied to SOS; s.s. <i>Atlas</i> first arrived and rescued all
October 23 ..	<i>Stanley Dollar</i> ..	Struck Viti Rocks on Pacific Coast	<i>Tahoma</i> answered call. Hauled vessel off rocks October 25
October ..	s.s. <i>Berkshire</i> ..	Burned off Lookout Cove, N.C.	SOS answered by <i>Seminole</i> (Revenue Cutter), which took off passengers
October ..	<i>Pleiades</i>	Collided off Pacific Coast with unknown ship	Distress calls answered; but vessel reached port safely
November 1 ..	s.s. <i>Norwega</i> ..	Collided with s.s. <i>Glenlui</i> , 95 miles south of Hatteras	Call answered by liner. battle ship, and two Revenue cutters; all saved
November 12..	s.s. <i>Oravia</i>	Ran on rocks off Falkland Islands	Assistance summoned and all saved
November 13..	Yacht <i>Wakiva</i> ..	Ashore 180 miles south of Galveston	Marconi Station, Galveston, responded to SOS and sent tug <i>Senator Bailey</i>
November 16..	s.s. <i>Balmes</i>	Caught fire in mid-ocean ..	SOS answered by s.s. <i>Pannonia</i> , which saved 125 lives
November ..	—	Great Lakes storms destroyed nineteen vessels, none of which were equipped with wireless	All vessels which were wireless equipped received warning of coming storm and sought safety

Date.	Name of Vessel.	Nature of Disaster.	Part Played by Wireless.
1914.			
January 4 ..	Oil-tank s.s. <i>Oklahoma</i>	Broke in two about seventy miles south of Sandy Hook	Spanish s.s. <i>Manuel Calvo</i> sighted wreck and advised Marconi Sea-Gate Station. Relief despatched and 13 out of 27 saved
January 26	<i>Yacht Warrior</i> , owned by F. W. Vanderbilt	Ran aground near Savanilla on the coast of Columbia	SOS brought s.s. <i>Almirante</i> , which took off owner and guests
January 30 ..	Old Dominion s.s. <i>Monroe</i>	Collided with s.s. <i>Nantucket</i> , and sank off Hog Island in twelve minutes	SOS picked up by Marconi Station at Virginia Beach; s.s. <i>Nantucket</i> rescued 98 whilst 43 were lost
February 14 ..	Lumber schooner <i>Yellowstone</i>	In distress in storm off Pacific Coast, asked passing vessel to send out wireless call	Another lumber vessel responded to SOS and towed <i>Yellowstone</i> to San Francisco
March 17 ..	s.s. <i>City of Sydney</i> ..	Ran on Sambro Rocks, N.S.	Wireless brought tugs from Halifax; 11 passengers 42 crew saved
April	<i>The Pectan</i> ..	Ran aground off Adam's Cove, Calif.	SOS reached <i>Argyl</i> and <i>Lansing</i> . Both were too large to enter between perilous rocks of the coast. Wrecker <i>Iagua</i> pulled vessel off rocks
May 3	Freighter <i>Columbian</i>	Caught fire about 300 miles south of Cape Race	Passing ship sent out wireless message broadcast. Consequently <i>Franconia</i> , <i>Manhattan</i> and <i>Seneca</i> picked up 30 survivors
May 29 ..	s.s. <i>Empress of Ireland</i>	Struck by s.s. <i>Storstad</i> and sunk seventeen minutes later	SOS answered by Father Point Station. Government boats rescued 452, whilst 1,024 were lost
June 5 ..	<i>The Northland</i> ..	Ran aground on Bartlett's Reef	Wireless answered by wrecking tug <i>Tasco</i>
August 17 ..	s.s. <i>Prince Albert</i> ..	Went ashore on Butterworth Rocks in dense fog	Wireless instrumental in saving all passengers and crew
August 25 ..	s.s. <i>Admiral Sampson</i>	Sank after collision with s.s. <i>Princess Victoria</i> off Point No Point, near Seattle, Wash.	SOS sent out by <i>Princess Victoria</i> and picked up by Marconi Station in Seattle, and tugs sent out
September 1 ..	s.s. <i>City of Chicago</i>	On fire twelve miles out from Chicago	Wireless utilised and ship returned safely to port
September 18..	s.s. <i>Francis H. Leggett</i>	Sank sixty miles south of Columbia river	Marconi Station at Astoria, Ore., intercepted message and notified all ships in vicinity to look for survivors. Two persons were rescued, 70 lost
October 11 ..	s.s. <i>Almirante</i> (United Fruit Co.)	Stranded at Cartagena Harbour	All saved—66 passengers, 90 crew
October 15 ..	s.s. <i>Metapan</i> ..	Rammed and sunk by <i>Iowan</i> at entrance of Ambrose Channel, New York	SOS answered by vessels in various parts of the harbour
October 28 ..	s.s. <i>Proteus</i> , Southern Pacific S.S. Co.	<i>En route</i> New Orleans from New York. Broke main shaft and lost propeller	Wireless answered by s.s. <i>El Oriente</i> , which towed vessel into New Orleans
November 10..	s.s. <i>Lakeland</i> ..	Ashore eight miles from Alpena	Marconi Station at Cleveland, Buffalo, and Tobermory answered SOS and sent tug to her assistance
November 23..	s.s. <i>Hanalei</i>	Struck reef opposite Transmitting Station of Marconi's Transpacific Service at Bolinas, California	SOS answered by Marconi Station at San Francisco, which sent rescuers. Wireless cabin was washed away, but Operator Lovejoy established communication with shore by means of pocket flash light, and directed work of rescue; 43 saved, 20 lost

Date.	Name of Vessel.	Nature of Disaster.	Part Played by Wireless.
1914.			
December 8 ..	s.s. <i>Momus</i> ..	Steering gear damaged ..	SOS answered by tug <i>El Ray</i>
December 11 ..	s.s. <i>Centralia</i> ..	In danger	SOS answered by steamers <i>Harvard</i> and <i>Bear</i>
December 19 ..	s.s. <i>Isthmian</i> ..	Struck rocks off San Benito Island	SOS answered by <i>West Virginia</i> , Destroyer <i>Perry</i> and Navy Tug <i>Iroquois</i>
December 22 ..	s.s. <i>Honolulu</i> ..	Ran aground	SOS responded to by six tugs
December 30 ..	s.s. <i>Colorado</i> ..	Machinery disabled off Little Egg Harbour, New Jersey	SOS responded to by tugs, which brought vessel into New York. Crew of 35 all saved
1915.			
January 3 ..	s.s. <i>Iowa</i>	Crushed in ice, Lake Michigan, off mouth of Chicago River	SOS sent out but steamer sank before rescue tugs arrived; all crew saved
January 8 ..	s.y. <i>Wakiva</i> ..	Went on rocks off Tampico, Mexico	SOS picked up by four steamers. Sea prevented lifeboats reaching wreck, but crew were rescued by use of breeches buoy
January 10 ..	s.s. <i>Mexicano</i> , Pierce Nav. Co.	Ran ashore on Tampico, Mexico, breakwater	SOS answered by Mexican Government Station at Tampico. Vessel floated by tugs
January 13 ..	s.s. <i>Cobequid</i> , R.M.S.P. Co.	Struck on Trinity Ledges, Bay of Fundy	Wireless brought aid, all saved
January 18 ..	s.s. <i>Camino</i> ..	Hopelessly adrift at sea ..	SOS brought Canadian Government steamer <i>Lady Laurier</i> and other vessels to rescue
January 26 ..	s.s. <i>Washingtonian</i> ..	Sank after collision with schooner <i>Elizabeth Palmer</i> off Delaware Breakwater	Crew in ship's boats reached Fenwick Island Lightship, which sent wireless messages to s.s. <i>Hamilton</i> , which took survivors to New York
February 4 ..	s.s. <i>Colon</i>	Stranded off bar at Topolobampa	SOS answered by three steamers which saved all on board
February 4 ..	Oil-tanker <i>Chester</i> ..	No wireless carried, but attracted <i>Philadelphia's</i> attention by sending SOS on Morse lights	<i>Philadelphia</i> established communication by this means and rescued 33 persons
February 19 ..	s.s. <i>Santa Marta</i> ..	Lost rudder in gale ..	SOS brought necessary aid
March 6 ..	s.s. <i>La Touraine</i> ..	On fire 400 miles west of Irish Coast	SOS answered by four vessels, including <i>Rotterdam</i> . Latter "stood-by" until fire was controlled
March 18 ..	s.s. <i>Santa Ana</i> , Alaska S.S. Co.	Wrecked on Kodiak Island, Alaska	Rescue effected
March 22 ..	s.s. <i>Denver</i>		SOS call established com-vessels. Crew all saved
March 25 ..	s.s. <i>Parisian</i> ..	Grounded in Mississippi River. While in this position she was struck on March 27 by s.s. <i>Heredia</i> , United Fruit Co.	Wireless brought aid to both vessels. There were 164 passengers on <i>Heredia</i>
March 27 ..	s.s. <i>Heredia</i> ..	Struck s.s. <i>Parisian</i>	Aid summoned (see above)
March 28 ..	s.s. <i>Falaba</i> in St. George's Channel	Attacked by German submarine	SOS signal answered from Land's End; British war-ships responded and 140 persons rescued out of 250 on board
March 30 ..	s.s. <i>Balmes</i>	Stranded on reef thirty miles west of Key West Naval Wireless Station	Key West Naval Radio Station answered call and sent out salvors
April 1 ..	s.s. <i>Mexico</i> , P.S.N. Co.	Ran aground near Southwest Pass, La	Wireless instrumental in bringing tugs to float vessel

Date.	Name of Vessel.	Nature of Disaster.	Part Played by Wireless.
1915. April 3..	.. s.s. <i>Prins Maurits</i> ..	Lost off Cape Hatteras, N.C.	SOS answered by several near-by vessels; none, however, were able to locate vessel
April 11	.. s.s. <i>Minnesota</i> ..	Ran on reef at entrance to Inland Sea in Japan	SOS answered by <i>Oanfa</i> , which stood by until Salvage Company brought assistance
April 14	.. s.s. <i>Seminole</i> ..	Wrecked off Yuma Bay ..	Wireless utilised but passengers reached shore before rescue arrived
April 21	.. s.s. <i>San Zeferino</i> ..	Grounded in Galveston Harbour	Wireless used to report
April 28	.. s.s. <i>Rewa</i> ..	Stranded at May Island ..	Wireless touch established with Cullercoats coast station. H.B.M. destroyers and trawlers summoned and ship refloated
April 29	.. s.s. <i>Edgar H. Vance</i>	Disabled by heavy seas 100 miles from San Francisco	Wireless brought aid; vessel towed safely back to port
May 7 ..	.. s.s. <i>Asuncion</i> ..	Ashore off Fraser River ..	Wireless brought tugs
May 7 ..	.. s.s. <i>Lusitania</i> ..	Torpedoed and sunk by German submarine	SOS brought rescue vessels; 764 saved, 1,157 lost
May 18	.. s.s. <i>Standard</i> ..	Fire in fuel bunkers. Lat. 22° 50' N., long. 88° 18' W.	Wireless brought three steamers whose crews extinguished fire. <i>Standard</i> was towed into port; 39 aboard
May 26	.. s.s. <i>Ryndam</i> ..	Collided with <i>Joseph J. Cuneo</i> off Atlantic Coast	Wireless brought two liners and four U.S. battleships, one of which conveyed <i>Ryndam</i> to New York
May 28	.. s.s. <i>Mackinaw</i> ..	On fire off San Francisco ..	Wireless brought tugs
May 28	.. s.s. <i>Dorchester</i> ..	Rammed by schooner <i>J. A. Palmer</i> , of Annapolis, Md.	Wireless used
May 31	.. s.s. <i>Seward</i> , Alaska S.S. Co.	Wrecked thirty-five miles off Cordova, Alaska	
June 3..	.. s.s. <i>Alliance</i> ..	Ashore Richmond Beach, Wash.	Wireless brought aid
June 9..	.. s.s. <i>A. W. Perry</i> , Plant Line	Wrecked, Chebucts Head, N.S.	SOS brought assistance; 42 passengers and crew saved
June 13	.. s.s. <i>Bunker Hill</i> ..	Collided with s.y. <i>Vanadis</i> off Eaton's Neck, Long Island Sound	Wireless established with near-by vessels and shore stations. Two killed and several injured
June 16	.. s.s. <i>Alabama</i> ..	Collided with s.s. <i>Delaware</i> , in dense fog	Wireless used to notify owners
June 28	.. s.s. <i>California</i> Anchor Line	Ran ashore at Tory Island	Wireless brought British destroyer to vessel
July 2 ..	.. s.s. <i>Panuco</i> ..	Grounded at entrance to South Pass, La.	Wireless brought aid; 35 aboard
July 10	.. Pilot boat <i>New Jersey</i>	Rammed and sunk by United Fruit Steamer <i>Marchioneal</i>	Fruit steamer saved crew, and SOS sent out brought many responses
July 11	.. s.s. <i>Invermore</i> ..	Wrecked near Brig Harbour Labrador	Wireless used and aid obtained
July 22	.. s.s. <i>Sucha</i> ..	On fire in Gulf of St. Lawrence	SOS answered by <i>Royal George</i> , which on reaching <i>Sucha</i> found fire put out
August 2	.. s.s. <i>Georgian</i> ..	Ashore near San Francisco in fog	Wireless used. No lives lost
August 4	.. <i>Emma Angel</i> ..	Storm battered and waterlogged, forty-five miles south-east of Highlands	<i>Emma Angel</i> signalled s.s. <i>Bermudian</i> , which wireless U.S. Revenue Cutter <i>Seneca</i> , and all aboard saved
August 18	.. s.s. <i>El Sud</i> ..	Stranded on Galveston Jetties during hurricane	Wireless brought assistance. Vessel towed into Galveston Harbour
August 23	.. s.s. <i>Metapan</i> ..	Grounded Cartagena Harbour	Cargo discharged into lighters and steamer floated; 45 passengers, 19 crew

Date.	Name of Vessel.	Nature of Disaster.	Part Played by Wireless.
1915.			
August 31 ..	s.s. <i>Edith</i> , Alaska S.S. Co.	Abandoned forty miles north-east Cape St. Elias	SOS brought aid, all saved
September 13 ..	s.s. <i>Sant Anna</i> , Fabre Line	On fire in mid-ocean, Lat. 40° 23' N., long. 47° 30' W.	SOS brought <i>Ancona</i> , which took off 600 out of the 1,700 persons on board, and conveyed distressed vessel to port
September 19 ..	s.s. <i>Athinai</i> ..	Destroyed by fire and abandoned in latitude 40° 54' N., longitude 58° 47' W.	SOS brought <i>Tuscania</i> and <i>Roumanian Prince</i> , which rescued passengers and crew, numbering 470 persons.
October 8 ..	s.s. <i>Mariposa</i> , Alaskan S.S. Co.	Ran aground in inner passage between Queen Charlotte and Milbank Sounds	Wireless brought s.s. <i>Despatch</i> , which took off passengers
November 1 ..	s.s. <i>Rochambeau</i> ..	On fire	SOS answered by many vessels. Fire got under control
November 2 ..	s.s. <i>Santa Clara</i> ..	Wrecked near entrance to Coos Bay, 170 miles south of Astoria	Wireless brought assistance, 15 passengers, 24 crew drowned, 93 saved
November 5 ..	s.s. <i>Fort Bragg</i> ..	Grounded in Gulf of California	U.S.S. <i>San Diego</i> responded to wireless and 47 saved
November 9 ..	s.s. <i>Lievatta</i> (Italian)	Loaded with cased kerosene and gasoline on fire, 65 miles off Sabine Bar, Texas	Reported by wireless by s.s. <i>Gulfstream</i> , which "stood-by" until other assistance arrived from Port Arthur and Galveston
November 27 ..	s.s. <i>Ancona</i> ..	Attacked by submarine off Tunis coast	Wireless brought s.s. <i>Pluton</i> of the French Navy, which rescued passengers
December 1 ..	s.s. <i>Flamenco</i> ..	Ran aground at South Pass, La.	Disaster reported
December 1 ..	s.s. <i>Minnesota</i> ..	Machinery disabled 760 miles south of San Francisco	Wireless brought s.s. <i>Iroquois</i> and tug <i>Dauntless</i>
December 5 ..	s.s. <i>Petrolite</i> ..	Shelled by submarine in Eastern Mediterranean	SOS brought American battleship
December 10 ..	s.s. <i>Shabenee</i> ..	Propeller broke off Newfoundland	SOS brought s.s. <i>Muskogee</i> and vessel towed into St Johns
December 13 ..	s.s. <i>Antilla</i> ..	Collided with barge, beached off Sea Gate	Wireless used; cargo saved
December 21 ..	s.s. <i>Yasakamaru</i> ..	Torpedoed by enemy submarine	All rescued by wireless
December 22 ..	s.s. <i>Thessaloniki</i> ..	West of Azores with engine-room flooded by heavy seas	SOS answered by s.s. <i>Stam-palia</i> , which "stood-by" until <i>Thessaloniki's</i> pumps worked again
December 28 ..	s.s. <i>Thessaloniki</i> ..	Again in distress	SOS answered by three vessels; s.s. <i>Patris</i> took off her 215 passengers. Crew of 90 rescued by s.s. <i>Perugia</i> several days later
1916.			
January 1 ..	s.s. <i>Vandeggen</i> ..	Disabled. Not equipped with wireless; attracted notice of s.s. <i>Muskogee</i>	Message sent broadcast giving position and steamer towed to port
January 17 ..	Car Ferry <i>Pere Marquette</i> 19	Aground four miles north of Ludington, 7.40 p.m.	Wireless established and vessel saved
January 19 ..	s.s. <i>Pollentia</i> ..	Sinking 706 miles off Cape Race in lat. 36° 30', long. 35° 04'	SOS answered by five vessels. The crew of 35 were rescued by <i>Giuseppe Verdi</i> , while <i>Narragansett</i> poured oil on waves
January 22 ..	s.s. <i>Centralia</i> ..	Heavy seas washed away deck load, broke rudder, flooded engine-room off Columbia River	SOS answered by five steamers and two land-stations. Weather having improved the ship reached San Francisco safely without assistance



MR. NICOLAAS KOOMANS, MANAGER OF THE NEDERLANDSCHE
VEREENIGING VOOR RADIOTELEGRAFIE.

(For biographical details, see page 1100.)

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Date.	Name of Vessel.	Nature of Disaster.	Part Played by Wireless.
1916.			
January 23 ..	s.s. <i>Brazos</i> and s.s. <i>Suffolk</i>	In collision near the Scotland Light in dense fog	SOS informed agents, who instructed the vessels to return to New York
January 24 ..	s.s. <i>Frank H. Buck</i>	Lost rudder 355 miles north San Francisco	Wireless brought aid
January 26 ..	s.s. <i>Proteus</i> ..	Collided with steamer <i>Brabant</i> below Narrows, New York Harbour	Agents of both vessels informed
January 30 ..	s.s. <i>Philadelphia</i> ..	Collided with sailing ship <i>Ben Lee</i> , twelve miles south of Carnarvon Bay	Wireless notified agents of accident
February 1 ..	s.s. <i>Takata Maru</i> ..	Collided with s.s. <i>Silver Shell</i>	Marconi Stations at Boston and Cape Race, also various steamers answered SOS. Crew rescued by <i>Silver Shell</i>
February 4 ..	s.s. <i>Texas</i> (Swedish)	Cargo of cotton on fire ..	Wireless first reported fire; then advised assistance not required
February 4 ..	s.s. <i>Howard</i> ..	Collided with barge off Point Judith	Wireless notified owners of accident
February 7 ..	s.s. <i>Harvard</i> ..	Rammed schooner <i>Excelsior</i> in San Francisco Bay	Wireless brought immediate assistance from shore
February 15 ..	s.s. <i>Pavlof</i> ..	Lost propeller and stranded on Tugidak Island, Alaska	Communication established with Naval Radio Station at Dutch Harbour and naval station at Kodiak; s.s. <i>Alameda</i> stood by until vessel was abandoned on reef
February 21 ..	s.s. <i>Middlesex</i> ..	Ashore inside Cross Rip ..	Captain of s.s. <i>Nacooche</i> learned plight by Morse lamp and summoned assistance by wireless
February 24 ..	s.s. <i>Cretan</i> ..	Struck by s.s. <i>Dorothy</i> three miles south-east Wimple Shoal Buoy	SOS answered by several ships. <i>San Jacinto</i> nearest and did most of work. Communication with Marconi Stations at Cape Hatteras and Virginia Beach maintained throughout
February 24 ..	s.s. <i>Polarine</i> ..	Went ashore on 23rd, near Helsingborg	SOS brought s.s. <i>Pioneer</i> from Copenhagen
February 29 ..	s.s. <i>Multnomah</i> ..	Struck Viti Rock off Lummi Island in heavy fog	Marconi Station at Seattle received call and reported accident
March 3 ..	s.s. <i>Chiyomaru</i> ..	Stranded near Hong-Kong	Wireless appeals secured rescue of all on board
March 4 ..	s.s. <i>Apache</i> ..	Machinery disabled forty-five miles south of Cape Henry, and anchored in twenty-five fathoms	SOS brought wrecking-tugs which towed her to port
March 5 ..	s.s. <i>Principe de Asturias</i>	Foundered off Ponta Boi, near Santos	SOS brought s.s. <i>Vega</i> , which rescued many of the 1,000 passengers and crew; 338 passengers, 86 crew lost
March 14 ..	s.s. <i>Kanawba</i> ..	Sprang a leak and sank off the coast of South Carolina	s.s. <i>Santa Maria</i> picked up 21 of crew and notified other steamers by wireless to search for other boat, containing seven of crew
March 16 ..	s.s. <i>Zealandia</i> , Fiske Trading Co.	Steering gear disabled 300 miles off Sandy Hook	SOS relayed to Marconi Station at Miami by Standard Oil Co's <i>Richmond</i> , and assistance sent
March 16 ..	s.s. <i>San Onofre</i> ..	Ran short of coal during blizzard off Newfoundland Coast	SOS brought s.s. <i>Ashiabula</i> which towed vessel to Halifax
March 16 ..	s.s. <i>Macona</i> ..	Ashore Barbuda Island, B.W.I.	Owners notified. Tugs sent

Date.	Name of Vessel.	Nature of Disaster.	Part Played by Wireless.
1916. March 16 ..	s.s. <i>Cubantia</i> ..	Sunk by mine or torpedo near Noordhinder Lightship	SOS first picked up at Hook of Holland. Dutch torpedo boat and lifeboats rescued all on board
March 21 ..	s.s. <i>Bradford</i> , leaving San Francisco	Accident to rudder ..	Communication established with Marconi San Francisco Station; tugs sent
March 22 ..	s.s. <i>Minneapolis</i> ..	Sunk by submarine in the Mediterranean	SOS brought rescue vessels
March 23 ..	<i>Svaland</i>	Dismasted in lat. 44° N., long. 55° 30' W.	Reported by Swedish s.s. <i>Murjek</i> , and tug demanded
March 23 ..	s.s. <i>Alamo</i>	Engine disabled, also broken rudder, 130 miles north-east of Cape Hatteras	SOS brought wrecking tug from Norfolk
March 31 ..	s.s. <i>Chiyo Maru</i>	Grounded in fog on Lema Islands	SOS brought nine tug-boats and launches, and British torpedo-boat destroyer, rescuing 299 passengers
April 2 ..	s.s. <i>Enterprise</i> ..	Broke main shaft and damaged stern	Wireless communication established with steamer <i>Manoa</i> 150 miles away. <i>Manoa</i> took <i>Enterprise</i> in tow
April 5 ..	s.s. <i>Patria</i> , Fabre Line	In distress in Mediterranean	Radiated call which was answered by s.s. <i>Siberia</i>
April 6 ..	s.s. <i>Zent</i> , Elders and Fyffes	Torpedoed without warning at Fastnet	SOS brought assistance and part of crew saved
April 8 ..	s.s. <i>Madison</i> , Old Dominion Line	Standing by two barges off Long Branch, N.J., flying distress signals, 6.15 p.m.	Five men rescued from barge and transferred to Coastguard Cutter <i>Mohawk</i> , from New York, which completed rescue
April 8 ..	Schooner <i>Emma E. Angell</i>	Lat. 37° 43', long. 75° 08', sunk in collision with steamer <i>Chepstow Castle</i>	<i>Chepstow Castle</i> rescued crew. Accident reported by radio
April 9 ..	s.s. <i>Guajara</i> ..	Badly disabled 301 miles south of Scotland Light	SOS brought s.s. <i>Sixaola</i> , which towed liner to Norfolk
April 10 ..	Steamer <i>San Ramon</i>	Pacific Coast; lost propeller at 3.30 a.m.	Wireless through Marconi Station, San Francisco, brought tugs
April 15 ..	Schooner <i>Wm. P. Hood</i>	Reported in distress fifty-seven miles south-west of Five Fathom Bank Lightship by steamer <i>James-town</i>	SOS brought Revenue Cutter <i>Mohawk</i>
April 15 ..	Schooner <i>Mary F. Morse</i>	In distress off Hatteras ..	s.s. <i>Lenape</i> "standing by" schooner notified Norfolk Station, which sent tugs
April 18 ..	Schooner <i>Millie R. Frank</i>	Seen in distress by s.s. <i>Madison</i> , which wireless call	Coastguard Cutter <i>Mohawk</i> rendered assistance. Crew rescued by Toms River coastguard
May 8 ..	s.s. <i>Philadelphian</i> ..	Collided with Fire Island Lightship	Communicated with Marconi Station at Sea Gate. Revenue Cutter despatched to help
May 9 ..	Fire Island Lightship	Rammed by s.s. <i>Philadelphian</i> in dense fog	SOS responded to by Coastguard cutter <i>Mohawk</i> . Lightship taken in tow by <i>Philadelphian</i> and brought to port
May 9 ..	s.s. <i>Roanoke</i> , North Pacific S.S. Co.	Foundered and sunk during daylight hours	Steamer <i>Edgar Vance</i> picked up two boats and notified Shore Stations of disaster. Six survivors, 48 lost
May 11 ..	Barge <i>Ivie</i> , New England Coal and Coke Co.	Rammed and sunk in Hampton Road by steamer <i>Berkshire</i>	Owners notified by radio. Crew of barge rescued by steamer

Date.	Name of Vessel.	Nature of Disaster.	Part Played by Wireless.
1916.			
May 14 ..	s.s. <i>Kandahar</i> ..	On fire in Ambrose Channel	Facts reported to agent, who sent fire boat from New York
May 15 ..	s.s. <i>San Giovanni</i> ..	In collision with s.s. <i>Grekland</i> in fog, in Ambrose Channel, near Sandy Hook	<i>San Giovanni</i> established communication with Marconi Station at Sea Gate. Three vessels afforded assistance
May 19 ..	s.s. <i>Catania</i> ..	Went ashore during heavy weather at Aransas, Pass Bar, Texas	SOS answered by Marconi Station at Galveston, which sent tug, which towed her to Aransas Docks
May 31 ..	s.s. <i>Miyazakimaru</i> ..	Torpedoed by enemy submarine	Wireless summoned aid all on board saved
June 14 ..	s.s. <i>Bear</i> , San Francisco and Portland S.S. Co.	Wrecked in dense fog off Cape Mendocino during evening	SOS brought three steamers and tug. Five lives were lost in transfer, while 200 were saved.
June 24 ..	s.s. <i>Fernando Po</i> ..	Stranded near Black Rock Light	SOS brought U.S.S. <i>Pathfinder</i> ; and crew, passengers and mails taken off
July 4 ..	s.s. <i>Anglo-Californian</i> en route Montreal to British Isles	Attacked by German U-boat	SOS sent out when submarine was sighted; British destroyers arrived and forced abandonment of attack
August 4 ..	s.s. <i>Siena</i> ..	Shelled by submarine off the coast of Marseilles	During the fight the survivors were rescued by a British cruiser, which answered SOS
August 17 ..	s.s. <i>Stamperia</i> ..	Torpedoed in the Ionian Sea	Wireless brought torpedo-boat - destroyer <i>Sabre</i> which rescued passengers
September 13.	s.s. <i>Antwerpen</i> (Dutch)	Torpedoed and sunk near England	SOS brought assistance to rescue of crew
September 14..	s.s. <i>Congress</i> , en route San Francisco to Seattle	Fire in hold and beyond control	<i>Congress</i> sent SOS which was picked up by Marconi Station at Eureka, Cal. Communication established with Marconi Station, Marshfield Harbour, and several vessels rushed to assistance. All rescued
September 23..	s.s. <i>Bay State</i> ..	Went ashore on rocks off Cape Elizabeth, Maine	SOS established communication with Naval Station at Cape Elizabeth. Revenue cutter <i>Ossipee</i> proceeded to wreck. Agents notified and sent tugs. All rescued
October 7 ..	s.s. <i>Antilla</i> , Ward Line ..	On fire off Virginia Capes ..	SOS brought s.s. <i>Somerset</i> , which saved all
October 8 ..	s.s. <i>Stephano</i> , s.s. <i>West Point</i> , and s.s. <i>Christian Knudsen</i>	Torpedoed and sunk by German submarine off Nantucket Lightship ..	SOS brought U.S. Navy ships <i>Jenkins</i> and <i>Balch</i> , which rescued all
November 3 ..	s.s. <i>Siberia</i> , en route Nova Scotia to London	Stranded in storm off Scilly Islands	SOS brought destroyers and coastguard to rescue. Ship lost but all the crew saved
November 29 ..	Standard Oil Barge 93..	In serious trouble at sea ..	SOS call received by Land's End. Patrol boats ordered to the rescue
December 4 ..	s.s. <i>Pio IX.</i> , en route New Orleans to Valencia	Sprung a leak in gale off Spanish coast	SOS call answered by s.s. <i>Buenos Aires</i> and French transport. Some of crew saved, 40 lost
December 13 ..	s.s. <i>Powhatan</i> , en route Norfolk to Boston	In collision with s.s. <i>Telena</i> in Chesapeake Bay	Distress call answered by Coastguard cutter <i>Yamacraw</i> . All on board saved

Date.	Name of Vessel.	Nature of Disaster.	Part Played by Wireless.
1916. December 25 ..	s.s. <i>Maitai</i>	Stranded on coral reef at Rarotonga, whilst discharging cargo	Wireless summoned aid from Papeete. All on board saved and most of cargo
1917. January 3 ..	s.s. <i>Tsushima Maru</i> , <i>en route</i> Orient to San Francisco	Ship afire in mid-Pacific ..	Distress call answered by s.s. <i>Standard Arrow</i> , 180 miles distant, which arrived and stood by until flames were under control
February 25 ..	s.s. <i>Laconia</i>	Torpedoed and sunk by German submarine off the Irish coast	SOS call brought British warships; survivors picked up in lifeboats
March 19 ..	s.s. <i>Alnwick Castle</i> ..	Attacked and sunk without warning by U-boat	SOS appeal for help sent out
April 22 ..	s.s. <i>Benin</i>	Broke shaft in heavy ice ..	Wireless enabled ship to be towed for 1,000 miles
July 15 ..	s.s. <i>Kristianiafjord</i>	Stranded near Cape Race. .	SOS summoned aid and wireless touch was maintained all through salvage operations
August 1 ..	s.s. <i>Navajo</i>	Afire in mid-ocean. . . .	SOS call broadcasted. Entire crew in lifeboat picked up by s.s. <i>Iossifoglu</i>
November 16 ..	s.s. <i>Orione</i>	Torpedoed in lower Adriatic	Was towed by torpedo-boat and tug-boat, which answered SOS
December 5 ..	s.s. <i>Apapa</i>	Torpedoed and sunk by German submarine	Wireless summoned aid
December 11 ..	s.s. <i>Cavour</i>	Sunk during night time, after collision with other vessel, near the Spanish coast	SOS brought Italian s.s. <i>Caprera</i> and <i>Nord America</i> which rescued 150 persons
1918. January 28 ..	s.s. <i>Andania</i>	Torpedoed by enemy submarine	Wireless used. All on board saved

PARTICULARS OF WIRELESS TELEGRAPH PATENTS IN 1917

INVENTIVE genius adapts itself to the needs of the times so that it is never at a loss for a means of expressing itself; this is a fact which is plainly evidenced by the steady concentration of inventors upon methods of and means for waging a successful war.

The subject matter of the applications range from small arms to battleships and prominent among these applications are those relating to Wireless Telegraphy and Telephony—in demand both in peace and in war—though not quite as prominent as in 1916. The total number of applications filed in 1917 exceed by about one thousand those filed in 1916; those having reference, both direct and indirect, to “wireless” total but one hundred and sixty in 1917 as compared with one hundred and ninety in 1916. The progress of these inventions through the Patent Office, however, has maintained the average; eleven applications having been abandoned while in provisional form, eight of those completed having been accepted previous to sealing, and six having been sealed. At the time of compiling our record for 1916 there were some one hundred and sixty applications still pending. Of these during the past year eighteen were abandoned, twelve were unaccepted in the appointed time and became void, and seventy were accepted, of which thirty-two have been sealed.

Foreign inventions continue to hold a prominent place among the recorded applications; there are sixteen applications communicated from abroad and forty-one applications in accordance with the International Convention. Of these latter France contributes nineteen, the United States twelve, Switzerland, five, Germany four, and Italy one.

The past year has witnessed steady concentration upon receiving apparatus of the Fleming valve type. The importance of this invention has been further endorsed by the judgment of the United States Circuit Court of Appeals confirming the judgment of Judge Mayer against the De Forest Company in America for infringement of the “Fleming Valve” Patent. To those suits enumerated in our last volume is now added another in America by the Marconi Wireless Telegraph Company of America against E. J. Simon for infringement of the “Four Sevens” Patent.

The following list of Patents, which in piping times of peace would have reflected a fairly correct estimate of the progress of the applied science, cannot be cited as a complete record. Many inventions have not as yet found their way to the Patent Office, since D.O.R.A. makes it necessary that they should remain State secrets, but doubtless these inventions will augment the records of the first years of peace.

BRITISH APPLICATIONS

Number.	Date.	Patentee and Description.
52	Jan. 7.—	W. B. VANSIZE—Apparatus for recording co. related light and sound variations. (Patent No. 107167. <i>Sealed.</i>)
438	Jan. 9.—	J. BETHENOD and E. GIRARDEAU—High-frequency alternator. (Convention application, France, Aug. 10, 1915. Patent No. 103657. <i>Sealed.</i>)
439	Jan. 9.—	J. BETHENOD and E. GIRARDEAU—Stators for electrical generators. (Convention application, France, Aug. 10, 1915. Patent No. 103658. <i>Open to inspection.</i>)
512	Jan. 10.—	G. CONSTANTINESCU and W. HADDON—Transmission of impulsive forces through liquids.
749	Jan. 15.—	BRITISH ELECTRICAL TRANSFORMER Co. and R. CROSBIE HALL—Phase transformation of electric currents and transformers for the same.
1050	Jan. 22.—	T. HARVEY—Receivers for telegraphy, telephones and the like.
1060	Jan. 22.—	J. HETHERINGTON—Multiple crystal detector for wireless telegraph instruments. (<i>Application abandoned.</i>)
1071	Jan. 22.—	BRITISH THOMSON-HOUSTON Co., LTD. (<i>General Electric Co., U.S.A.</i>)—Antennæ for wireless signalling.
1460	Jan. 29.—	SOCIÉTÉ FRANÇAISE RADIO-ÉLECTRIQUE—Wireless telegraphy. (Convention application, France, Feb. 15, 1916.)
1504	Jan. 30.—	G. CONSTANTINESCU and W. HADDON—Transmission of energy by wave motion. (<i>Application abandoned.</i>)
1515	Jan. 30.—	N. OBONKHOFF—Frequency changers and generators of alternating electric currents.
1581	Jan. 31.—	BRITISH WESTINGHOUSE ELECTRICAL AND MANUFACTURING Co.—Vacuum type electric converters.
1587	Jan. 31.—	BRITISH ELECTRICAL TRANSFORMER Co.—Poly-phase transformers.
1637	Feb. 1.—	R. J. W. BROWN—Method of combining light and heat vibrations and of projecting the resultant rays to a distance.
1712	Feb. 2.—	W. V. FOULIS and J. T. IRWIN—Apparatus for producing sound waves for signalling. (<i>Application abandoned.</i>)
2092	Feb. 12.—	J. & R. J. THOMPSON—Electrical generating apparatus. (No. 2093.)—Wireless telegraph apparatus. (<i>Accepted.</i> Patent No. 110685.)
2116	Feb. 12.—	G. CONSTANTINESCU and W. HADDON—Storage and utilisation of energy by means of liquids.
2158	Feb. 13.—	ALLGEMEINE ELEKTRICITÄTS GES.—Continuous current measuring apparatus. (Convention application, Germany, Jan. 24, 1914. Patent No. 104180. <i>Open to inspection.</i>)
2159	Feb. 13.—	I. HORTIK—Wireless telegraphy and telephony. (Nos. 2194 and 2507. <i>Applications abandoned.</i>)

- 2582 Feb. 21.—G. C. EVANS and THE SUBMARINE SIGNALLING CO.—Electrical oscillating apparatus.
- 2617 Feb. 22.—A. E. McCOLL—Protective devices for alternating current electrical systems. (Divided application upon No. 10227/16. Patent No. 109009. *Sealed.*)
- 2656 Feb. 22.—G. A. BEAUVAIS and L. N. BRILLOUIN—Receiving apparatus for wireless telegraphy. (Convention application, France, March 27, 1916.)
- 2657 Installation for wireless telegraphy and telephony. (Convention application, France, Nov. 7, 1916.)
- 2788 Feb. 26.—W. H. WILSON—Apparatus for producing or utilising electrical oscillations.
- 2874 Feb. 27.—P. D. LUCAS—Receivers for wireless telegraphy. (*Application abandoned.*)
- 2940 Feb. 28.—R. A. FESSENDEN—Transmission of sound and like impulses. (Convention application, United States, May 12, 1916. Patent No. 106268. *Sealed.*)
- 3039 March 1.—L. COHEN—Wireless radio-signalling by the arc system.
- 3476 March 9.—A. M. TAYLOR—Regulation of voltage of alternating current systems. (*Application abandoned.*)
- 3558 March 10.—W. J. LYONS and THE SELECTIVE SIGNAL CO.—Apparatus for the reception and utilisation of electric current impulses.
- 3657 March 13.—BRITISH WESTINGHOUSE ELECTRICAL MFG. CO.—Systems of control. (No. 3658.) Transformation of single phase alternating electric current into polyphase currents. (Convention applications, United States, March 13, 1916. Patents No. 105329 and No. 105330, *Accepted.*)
- 3709 March 14.—R. A. MACK, G. H. NASH and THE WESTERN ELECTRIC CO.—Signalling and sound detecting systems. (*Application abandoned.*)
- 3811 March 15.—H. HURM—Crystalline and like detectors for electric waves. (Convention application, France, March 21, 1916. Patent No. 105905. *Open to inspection.*)
- 3974 & March 19.—E. R. CLARKE—Sound wave receivers.
- 3975
- 4174 March 22.—R. BOIN—Continuous current electric generators. (*Application abandoned.*)
- 4427 March 27.—SIR G. MARCONI, G.C.V.O.—Reflector aerials for wireless telegraphy and telephony. (Convention application, Italy, March 28, 1916. Patent No. 105909. *Open to Inspection.*)
- 4950 April 5.—MARCONI'S WIRELESS TELEGRAPH CO., LTD. and HARRY A. EWEN—Instrument for measuring electric currents.
- 5073 April 11.—A. E. McCOLL—Alternating current electrical system. (*Application abandoned.*)
- 5254 April 13.—K. TROSDAHL—Electric current interrupters. (Patent No. 111968. *Accepted.*)
- 5333 April 16.—A. J. MARTIN—Wireless receiving circuits. (*Application abandoned.*)

- 5363 April 16.—M. LATOUR—Audion or lamp relay or amplifying apparatus for wireless telegraphy and telephony. (Convention application, France, April 15, 1916.)
- 5401 April 17.—O. LORAS—Transformers for alternating electric currents. (Convention application, France, June 9, 1916. Patent No. 106987. *Sealed.*)
- 5451 April 18.—BRITISH THOMSON-HOUSTON CO., LTD. (*General Electric Co., U.S.A.*)—Protective devices for electrical apparatus. (No. 5519.) Wireless signalling systems.
- 5577 April 20.—T. J. GRAINGER and J. A. W. WARD—Sound augmenting and transmitting instruments. (Patent No. 108290. *Sealed.*)
- 5738 April 24.—BRITISH THOMSON-HOUSTON CO., LTD. (*General Electric Co., U.S.A.*)—Wireless signalling systems.
- 6335 May 4.—M. L. LANCASTER—Detectors for wireless telegraphy. (No. 6341.) Receivers for wireless telegraphy.
- 6433 May 5.—MARCONI'S WIRELESS TELEGRAPH CO., LTD. and I. SHOENBERG—Thermionic devices for wireless telegraphy.
- 6508 May 8.—MESSRS. CRAMPTON & Co. and N. PENSABENE—High-frequency alternating current dynamos.
- 6794 May 12.—MARCONI'S WIRELESS TELEGRAPH CO., LTD. and G. M. WRIGHT—Thermionic devices for magnification and rectification.
- 6802 May 12.—BRITISH THOMSON-HOUSTON CO. (*General Electric Co., U.S.A.*)—System of phase modification.
- 7122 May 17.—LEE DE FOREST and C. V. LOGWOOD—Radio signalling systems. (Convention application, United States, May 23, 1916. Patent No. 107001. *Open to inspection.*)
- 7150 May 18.—S. HALL—Aerials for wireless telegraphy. (Patent No. 110513. *Accepted.*)
- 7185 May 18.—DUBILIER ELECTRICAL SYNDICATE—Electrical condensers. (Convention application, United States, May 2, 1916. Patent No. 107002. *Open to inspection.*)
- 7200 May 18.—S. G. BROWN—Improvements in microphones. (No. 7206.) Ionic relays, amplifiers and detectors. (No. 7254.) Telephonic and like receivers.
- 7427 May 23.—BRITISH THOMSON-HOUSTON CO. (*General Electric Co., U.S.A.*)—Wireless telegraph apparatus.
- 7558 May 25.—DUBILIER ELECTRICAL SYNDICATE—Forming arcs or other relatively low voltage electric currents across a gap or other resistance. (Convention application, United States, Aug. 15, 1916. Patent No. 108851. *Open to inspection.*)
- 7606 May 26.—WESTERN ELECTRIC CO.—Cores for Pupin loading coils, magnets, and the like. (Convention application, United States, May 26, 1916. Patent No. 107007. *Accepted.*)
- 7680 May 29.—F. P. DRIVER, C. H. HARVEY, O. DURDLE and
7681 & THE OSRAM-ROBERTSON LAMP WORKS—Transmitting
7682 valves for wireless telegraphy.
- 7689 May 29.—H. J. C. PROUMEN—Means for controlling movements in two directions from a distance.

- 7957 June 2.—G. GILES—Electric spark gap protective device. (Convention application, Switzerland, June 26, 1916. Patent No. 108467. *Accepted.*)
- 7961 June 4.—G.W.R. and T. P. K. CROSLAND—Preparation of sensitised paper for obtaining X-ray photographs of radiograms.
- 8232 June 8.—J. BETHENOD—Radio telegraphy and telephony. (Convention application, France, May 26, 1916. Patent No. 107581. *Open to inspection.*)
- 8482 June 13.—WESTERN ELECTRIC Co. (*for Matériel Téléphonique Soc. Anon.*)—Telephone system for aeroplanes.
- 8553 June 14.—A. H. MORSE, H. R. RIVERS-MOORE and THE INDO-EUROPEAN TELEGRAPH Co., LTD. Electrical oscillating or wireless systems and apparatus. (Divided application upon No. 9833/16. Patent No. 107958. *Sealed.*)
- 8634 June 15.—F. CREED—Phase transformers or converters.
- 8894 June 21.—H. VON KRAMER—Wireless telegraphy.
- 9111 June 24.—A. KOWALSKI—Electrical condensers for high-tension and high-frequency currents. (Convention application, Switzerland, June 24, 1916. Patent No. 108468. *Open to inspection.*)
- 9287 June 28.—BRITISH THOMSON-HOUSTON Co. (*General Electric Co, U.S.A.*)—Wireless signalling system.
- 9308 June 28.—A. KOWALSKI—Electrical condensers for high-tension and high-frequency currents. (Convention application, Switzerland, April 13, 1917.)
- 9480 June 30.—H. PEARCE—Protection devices for alternating current circuits.
- 9585 July 3.—MARCONI'S WIRELESS TELEGRAPH Co., LTD., H. M. DOWSETT and W. PLATT—Improvement in electrical interrupters.
- 9855 July 7.—A. KOWALSKI—Spark dischargers producing impulse excitation and high-frequency sparks. (Convention application, Switzerland, July 25, 1916. Patent No. 108309. *Open to inspection.*)
- 9897 July 9.—MARCONI'S WIRELESS TELEGRAPH Co., LTD. and V. M. SMART—Improvement in electric buzzers.
- 9898 July 9.—W. H. GRINSTEAD—Thermionic detectors for alternating currents.
- 9910 July 9.—J. BOUTELLE—Sound generating apparatus. (Convention application, France, July 7, 1916. Patent No. 107977. *Open to inspection.*)
- 10119 July 12.—MESSRS. CREED & Co. and N. F. S. HECHT—Means for producing high voltage discharges.
- 10182 July 13.—A. KOWALSKI—Blow-out spark discharger for impulse excitation and for high spark frequencies. (Convention application, Switzerland, June 2, 1917.)
- 10211 July 14.—J. G. H. BROOKES—Aerial electric dispatch or transmission apparatus.
- 10525 July 21.—A. E. ERICSON—Radio-controlled torpedoes.
- 10748 July 26.—BRITISH THOMSON-HOUSTON Co. (*General Electric Co., U.S.A.*)—Wireless signalling systems.

- 10830 July 27.—D. W. BROWN—Utilisation of high-frequency oscillations in wireless installations.
- 11217 Aug. 3.—A. GARBARINI, G. GAUTIER and L. MAUCLAIRE—Electric arc lamps with rotary arcs in connection with wireless telegraphy and telephony.
- 11298 Aug. 4.—F. P. DRIVER and THE OSRAM-ROBERTSON LAMP WORKS—Means for supporting electrodes in ionic tubes.
- 11360 Aug. 7.—SOCIÉTÉ FRANÇAISE RADIO-ÉLECTRIQUE—Alternating current generator and group converter. (Convention application, France, Aug. 4, 1916.)
- 11380 Aug. 8.—M. SANTANGELS—Thermo-electric generators.
- 11658 Aug. 14.—E. BINNETTI—Apparatus for concentration of electric waves in a single direction or upon a fixed point.
- 11990 Aug. 21.—AKT. GES. BROWN BOVERI ET CIE—Means for uniform distribution of current to direct current units connected in parallel. (Convention application, Germany, Aug. 21, 1916. Patent No. 109799. *Open to inspection.*)
- 12191 Aug. 24.—R. J. JENSEN—System of production of three-phase alternating current system.
- 12266 Aug. 27.—W. S. DENNETT—Electrical condensers.
- 12421 Aug. 29.—MARCONI'S WIRELESS TELEGRAPH CO., LTD. and C. S. FRANKLIN—Receivers for wireless telegraphy. (No. 12441.) Reflectors for wireless telegraphy and telephony. (No. 12577.) Receivers for wireless signals.
- 12712 Sept. 5.—P. D. LUCAS and THE OSRAM-ROBERTSON LAMP WORKS—Receivers for wireless telegraphy.
- 12911 Sept. 8.—MARCONI'S WIRELESS TELEGRAPH CO., LTD. and C. S. FRANKLIN—Wireless telegraph transmitters.
- 13028 Sept. 11.—O. DURDLE and THE OSRAM-ROBERTSON LAMP WORKS—Electrodes for ionic tubes for use in wireless telegraphy and telephony.
- 13094 Sept. 12.—M. LATOUR—Audion or lamp relays or amplifying apparatus for use in wireless telegraphy and telephony. (Convention application, France, Sept. 12, 1916.)
- 13073 Sept. 12.—WESTERN ELECTRIC CO.—Wireless telegraphy and telephony.
- 13196 Sept. 14.—J. W. ROEBUCK—Apparatus for detecting variations in a magnetic field.
- 13225 Sept. 14.—W. J. LYONS and THE SELECTIVE SIGNAL CO.—Apparatus for the reception and utilisation of electro-current impulses for wireless telegraphy and telephony.
- 13473 Sept. 19.—S. A. POLLOCK—Rectification of alternating currents.
- 13542 & Sept. 20.—O. DURDLE and THE OSRAM-ROBERTSON LAMP
13543 WORKS—Means for supporting electrodes in ionic tubes for use in wireless telegraphy and the like.
- 13950 Sept. 27.—J. KRUYSWIJK—Transmission of power by means of alternating currents.
- 13981 Sept. 28.—W. SURTEES—Spark arrester and receiver.
- 14029 Sept. 28.—G. CONSTANTINESCU and W. HADDON—Liquid wave transmission.

- 14049 Sept. 28.—E. R. CLARKE—Valve receivers for wireless telegraphy.
- 14165 Oct. 1.—M. LATOUR—Audion or lamp relays or amplifying apparatus for wireless telegraphy. (Convention application, France, Sept. 30, 1916.)
- 14284 Oct. 3.—CREED & Co.—Sound reproducing apparatus.
- 14360 Oct. 4.—A. C. GUNSTONE and G. PEARCE—High-frequency spark gap. (No. 14361.) Rectifier for mercury interrupter.
- 14411 Oct. 5.—SIEMENS SCHUCKERTWERKE — Electrical transformers and the like. (Convention application, Germany, Dec. 2, 1916.)
- 14597 Oct. 9.—BRITISH THOMSON-HOUSTON Co. (*General Electric Co., U.S.A.*)—Signalling systems.
- 14622 Oct. 9.—R. A. FESSENDEN—Detectors of low-frequency impulses. (Convention application, United States, May 21, 1917.) (No. 14626.) Detectors of submarine impulses. (Convention application, United States, March 29, 1917.)
- 14652 Oct. 10.—BRITISH THOMSON-HOUSTON Co. (*General Electric Co., U.S.A.*)—Method of amplifying small currents.
- 14796 Oct. 12.—E. R. CLARKE—Directive wireless telegraphy.
- 14981 Oct. 16.—F. KESSERLING—Continuous current dynamos. (Divided application on No. 8150/16. Patent No. 112116. *Accepted.*)
- 14983 Oct. 16.—A. F. SYKES—Means for detecting and locating subaqueous sounds.
- 15021 Oct. 17.—J. T. JOHN—Apparatus for producing oscillatory motion.
- 15435 Oct. 24.—A. MARR—Apparatus for the transmission and reception of sounds.
- 15488 Oct. 24.—SOCIÉTÉ FRANÇAISE RADIO-ÉLECTRIQUE—Radio-telegraphy and telephony. (Convention application, France, Oct. 24, 1916. Patent No. 111472. *Open to inspection.*)
- 15543 Oct. 25.—M. LATOUR—Audion or lamp relays or amplifiers for wireless telegraphy and telephony. (Convention application, France, Oct. 23, 1916.)
- 15610 & Oct. 26.—J. H. ROGERS and H. H. LYON—Wireless signalling systems. (Convention application, United States, Nov. 10, 1916.)
- 15611
- 15844 Oct. 30.—SOCIÉTÉ FRANÇAISE RADIO-ÉLECTRIQUE—Radio Telegraphy and telephony. (15846.) High-frequency alternators. (Convention application, France, Oct. 30, 1916. Patent Nos. 111475 and 111476. *Open to inspection.*)
- 15941 Nov. 1.—G. CONSTANTINESCU—Means for the transmission of impulsive forces.
- 16638 Nov. 13.—BRITISH THOMSON-HOUSTON Co. (*General Electric Co., U.S.A.*)—Measuring instruments.


- 16676 Nov. 13.—E. BERRY—Voltage regulation of alternators. (No. 16677.) Improvement in electrical transformers for regulating or varying voltage of current supplied therefrom.
- 16708 Nov. 14.—A. E. MCCOLL—Protective devices for alternating current electrical systems.
- 16717 Nov. 14.—BRITISH THOMSON-HOUSTON CO. (*General Electric Co., U.S.A.*)—Frequency transformers.
- 16738 Nov. 14.—AJAX METAL CO.—Oscillation current method and apparatus. (Convention application, United States, Nov. 25, 1916.)
- 16760 Nov. 14.—J. H. HAMMOND—Systems for the transmission and reception of electro-radiant energy. (Convention application, United States, September 28, 1916.) (16855.) Dirigible devices.
- 17511 Nov. 27.—WESTERN ELECTRIC CO.—Signalling generators.
- 17525 Nov. 27.—P. S. GOMEZ—Electric telephony.
- 17529 Nov. 27.—BRITISH THOMSON-HOUSTON CO. (*General Electric Co., U.S.A.*)—Vacuum electric discharge devices.
- 17617 Nov. 28.—S. G. BROWN and J. PERRY—Receiving or detecting apparatus for sound waves or the like.
- 17674 Nov. 29.—A. MARINO—Spintherometers for use in wireless telegraphy.
- 17722 Nov. 30.—C. J. QUILL—Alternating current rectifiers.
- 17941 Dec. 4.—F. HOGE—Leading-in wires or conductors for incandescent electric lamps, high vacuum apparatus and the like.
- 17986 Dec. 5.—BRITISH THOMSON-HOUSTON CO. (*General Electric Co., U.S.A.*)—Electric insulators.
- 18201 Dec. 7.—SOCIÉTÉ FRANÇAISE RADIO-ÉLECTRIQUE—Telephone receivers. (Convention application, France, Dec. 7, 1916.)
- 18228 Dec. 8.—BRITISH THOMSON-HOUSTON CO. (*General Electric Co., U.S.A.*)—Wireless signalling systems.
- 18339 Dec. 11.—A. MARR—Telephone transmitters.
- 18413 Dec. 12.—SIEMENS SCHUCKERTWERKE—Electrical transformers. (Convention application, Germany, July 9, 1917.)
- 18621 Dec. 14.—M. LATOUR—Audion or lamp relays or amplifying apparatus. (Convention application, France, Nov. 30, 1916.)
- 18700 Dec. 15.—H. WADE (*communicated by H. S. Mills*) Electric current rectifier.
- 18917 Dec. 20.—H. SMITH—Means for transferring vibrations. (Convention application, United States, Aug. 23, 1916.)
- 18920 Dec. 20.—M. LATOUR—Audion or lamp relays or amplifying apparatus. (Convention application, France, Dec. 20, 1916.)
- 19090 Dec. 27.—J. F. MILLER—Rectifiers for wireless telegraphy.
- 19099 Dec. 27.—A. MARR—Telephone transmitters.
- 19108 Dec. 27.—R. BEATTIE—Electro-magnetic means for detecting submarines.

- 19355 Dec. 31.—A. F. SYKES—Means for detecting and locating subaqueous sounds.

AMERICAN PATENTS.

- 1210540 Jan. 2.—HANS EWALD REINHOLD RUKOP AND WILHELM K. M. SCHLOEMILCH (Berlin, Germany)—Cathode ray tubes working as pure electron tubes, under a high vacuum. (*Assigned to Ges. für Drahtlose Tel. m.b.h.*)
- 1210678 Jan. 2.—ALEXANDER MCLEAN NICOLSON (New York)—Thermionic amplifiers. (*Assigned to Western Electric Co., New York.*)
- 1211091 Jan. 2.—WILLIAM D. COOLIDGE (Schenectady, N.Y.)—Vacuum discharge tubes acting with a pure electron discharge independent of gas ionisation. (*Assigned to the General Electric Co., New York.*)
- 1211092 Jan. 2.—WILLIAM D. COOLIDGE (Schenectady, N.Y.)—Vacuous tube which may be operated with an alternating current. (*Assigned to the General Electric Co., New York.*)
- 1211376 Jan. 2.—WILLIAM D. COOLIDGE (Schenectady, N.Y.)—Electron discharge apparatus and means for operating the same. (*Assigned to the General Electric Co., New York.*)
- 1211754 Jan. 9.—PAUL C. RAWLS (Des Moines, Iowa)—Crystal rectifier for use in high-frequency oscillation detectors in wireless telegraphy and telephony.
- 1211770 Jan. 9.—FREDERICK G. SIMPSON (Seattle, Washington)—Improvements in micro-magnetic apparatus for receiving signals of the Hertzian wave type.
- 1211863 Jan. 9.—DAVID MCCAIG (Lancaster, Penn.)—Apparatus for and method of producing high-frequency currents of electricity.
- 1211963 Jan. 9.—JOHN A. PROCTER (Revere, Mass.)—Improvements in Radio-receiving apparatus. (*Assigned to the Wireless Speciality Apparatus Co., Boston, Mass.*)
- 1212163 Jan. 9.—ERIC M. C. TIGERSTEDT (Copenhagen, Denmark)—Relay for undulatory currents.
- 1213250 Jan. 23.—GREENLEAF W. PICKARD (Amesbury, Mass.)—Improvements in means for receiving intelligence communicated by electric waves. (*Assigned to the Wireless Speciality Apparatus Co., New York.*)
- 1213616 Jan. 23.—CHARLES E. FRITTS (Oneonta, N.Y.)—Means for producing, controlling, and utilising electric currents.
- 1214022 Jan. 30.—PHILIP E. EDELMAN (Minneapolis)—Improvements in Wireless Telegraph Apparatus and the like.
- 1214214 Jan. 30.—PEDER O. PEDERSEN AND VALDEMAN POULSEN (Frederiksberg, Denmark)—Improvements in generators of high-frequency currents. (*Assigned to the Federal Telegraph Co., California.*)
- 1214265 Jan. 30.—MILTON BEREL AND LOUIS FUNKE (New York)—Improvements in wireless telegraph detectors of the crystal type.

- 1214283 Jan. 30.—LEE DE FOREST (Palo Alto, California)—Improvements in systems of antennæ for wireless telegraphy. (*Assigned to the Federal Telegraph Co., California.*)
- 1214500 Feb. 6.—CHARLES F. W. BATES (Cleveland, Ohio)—Improvements in Anodes for vacuum discharge tubes.
- 1214591 Feb. 6.—GUSTAV REUTHE (Sayville, N.Y.)—Improvements in antennæ for radiotelegraph stations. (*Assigned to the Atlantic Communication Co., New York.*)
- 1214620 Feb. 6.—GRAF VON ARCO AND A. MEISSNER (Berlin)—Means for producing electrical oscillations with the aid of an auxiliary oscillation circuit. (*Assigned to Gesellschaft für drahtlose telegraphie, m.b.h., Berlin, Germany.*)
- 1214655 Feb. 6.—BURR V. DEITZ (Slingerlands, N.Y.)—Wireless telephone apparatus.
- 1216538 Feb. 20.—GRAF VON ARCO AND RAGNAR H. RENDAHL (Berlin)—Means for producing electrical oscillations. (*Assigned to Gesellschaft für drahtlose telegraphie, m.b.h., Berlin, Germany.*)
- 1216615 Feb. 20.—GEORGE SEIBT (New York)—Apparatus for producing powerful electrical oscillations. (*Assigned to the Atlantic Communication Co., New York.*)
- 1216646 Feb. 20.—JAMES C. ARMOR (Ingram, Penn.)—Method of producing high-frequency oscillatory currents.
- 1216647 Feb. 20.—JAMES C. ARMOR (Ingram, Penn.)—Discharge device adapted for obtaining a rapid succession of non-oscillatory impulses.
- 1216720 Feb. 20.—MARION A. MULRONY (Randwick, Sydney, Australia)—Wireless telegraph transmitter of a portable type.
- 1217516 Feb. 27.—FREDERICK G. SIMPSON (Seattle, Washington)—Transmitting apparatus for wireless telegraph stations.
- 1217517 Feb. 27.—FREDERICK G. SIMPSON (Seattle, Washington)—Radiotelegraph and telephone system.
- 1217483 Feb. 27.—THOMAS B. MILLER (Seattle, Washington)—Transmitting apparatus for wireless telegraph stations. (*Assigned to the Wireless Instrument Co., Seattle.*)
- 1218195 March 6.—CHARLES V. LOGWOOD (New York)—System for transmitting communications. (*Assigned to the De Forest Radio Telephone and Telegraph Co., New York.*)
- 1218237 March 6.—ANDRE BLONDEL (Paris)—Method and apparatus for determining the direction of a Hertzian lighthouse.
- 1219215 March 13.—JAMES C. ARMOR (Brooklyn, N.Y.)—System of
& 1219216 space signalling. (*Assigned to the General Electric Co., New York.*)
- 1219550 March 20.—WALTER HAHNEMANN (Kützberg, Germany)—Antenna structure on aeroplanes for wireless signalling. (*Assigned to the Signal Gesellschaft, m.b.h., Kiel, Germany.*)
- 1219888 March 20.—FRANK WALLBERG (New York)—Combined receiver and detector for wireless telegraphy.

- 1220005  March 20.—JAMES H. ROGERS AND HENRY H. LYON (Hyattsville, Maryland)—Wireless transmission and reception apparatus comprising an antenna buried under but insulated from the surface of the earth.
- 1220072 March 20.—LOUIS COHEN (Washington)—An arc system comprising two oscillatory circuits shunted across the arc and means for producing radically different electrical time constants in the two circuits.
- 1220833 March 27.—HARRY A. EWEN (London)—Improvement in measuring instruments. (*Assigned to the Marconi Wireless Telegraph Company of America, New York.*)
- 1220920 March 27.—ARCHIE J. WILLIAMS (Covington, Kentucky)—Wireless sounders in which the magnets are made adjustable with relation to the diaphragms.
- 1221033 April 3.—LEE DE FOREST (San Francisco, Cal.)—System of multiplex wireless signalling.
- 1221034 April 3.—LEE DE FOREST (San Francisco, Cal.)—Oscillating-current generators.
- 1221035 April 3.—LEE DE FOREST (San Francisco, Cal.)—Apparatus for use in wire or radio-communications. (*Patents assigned to the Radio Telephone and Telegraph Co., New York.*)
- 1221787 April 3.—ETTORE BELLINI (Enghien-les-Bains, France)—Apparatus for directed wireless telegraphy and telephony.
- 1222567 April 10.—FREDERICK G. SIMPSON (Seattle, Washington)—Transmitting apparatus for wireless telegraph stations.
- 1222761 April 17.—CHARLES D. HERROLD (San José, Cal.)—Improved apparatus for the production of oscillatory currents.
- 1222916 April 17.—CLIFFORD D. BABCOCK (New York)—Ionised chamber device adapted for detecting, amplifying, relaying, etc., electrical currents or variations of direction or steadiness of flow thereof.
- 1223376 April 24.—LLOYD ESPENSCHIED (Brooklyn, N.Y.)—Receiving system adapted to overcome atmospheric or static disturbances. (*Assigned to the American Telephone and Telegraph Co., N.Y.*)
- 1223589 April 24.—AUGUST J. KLONECK (New York)—Device for producing high-frequency electrical oscillations and for amplifying weak signals.
- 1224048 April 24.—EGBERT VON LEPEL (Berlin-Wilmersdorf, Germany)—Method for producing electrical oscillations of high-frequency from direct current.
- 1224343 May 1.—JAMES O. WATKINS (San Francisco, Cal.)—Apparatus for the conversion of oscillations of high frequency into others of lower frequency. (*Assigned to the Federal Telegraph Co., San Francisco.*)
- 1224499 May 1.—GREENLEAF W. PICKARD (Amesbury, Mass.)—Improvements in receiving apparatus for wireless telegraphy and telephony. (*Assigned to the Wireless Speciality Apparatus Co., Boston.*)

- 1224639 May 1.—PETER COOPER HEWITT (New York)—Apparatus for transforming electrical energy. (Division of application No. 264071, filed June 7th, 1905.)
- 1225332 May 8.—Method of and apparatus for translating electrical variations. (Division of application No. 365597, filed March 30th, 1907.) (*Patents assigned to the Cooper-Hewitt Electric Co., New Jersey.*)
- 1225333 May 8.—PETER COOPER HEWITT (Ringwood Manor, New Jersey)—Apparatus for translating electrical variations.
- 1225852 May 15.—GREENLEAF W. PICKARD (Amesbury, Mass.)—Rectifier of oscillating or alternating currents as used in wireless telegraphy. (*Assigned to the Wireless Speciality Apparatus Co., New York.*)
- 1225860 May 15.—FRANK RIEBER (San Francisco, Cal.)—System of electric control particularly adapted to valve apparatus. (*Assigned to the Rieber Laboratories, San Francisco.*)
- 1226060 May 15.—ELMER E. BUTCHER (Interlaken, N.J.)—Improvements in receivers of electrical oscillations. (*Assigned to the Marconi Wireless Telegraph Company of America, New York.*)
- 1226090 May 15.—GUGLIELMO MARCONI (London)—Transmitting apparatus for the generation of continuous oscillations or groups thereof for use in wireless telegraphy and telephony. (*Assigned to the Marconi Wireless Telegraph Company of America, New York.*)
- 1227521 May 22.—JOHN GROEME BALSILLIE (Melbourne, Australia)—Wireless telegraph transmitter.
- 1228065 May 29.—GEORGE SEIBT (Berlin)—Current indicating apparatus for direct-reading wave-meters for high-frequency oscillations. (*Assigned to the General Transmission Co., New York.*)
- 1228647 June 5.—ELMER E. BUTCHER (Interlaken, N.J.)—Improvement in oscillation receiving apparatus. (*Assigned to the Marconi Wireless Telegraph Company of America, New York.*)
- 1228892 June 5.—ARTHUR E. ERICSON (Manchester, Mass.)—Improved method of controlling torpedoes by radio-telegraphy.
- 1229914 June 12.—PHILIP DUBILIER (New York)—Improvements in
& 1229915 electrical condensers. (*Assigned to the Dubilier Condenser Co., New York.*)
- 1230004 June 12th.—GEORGE S. MEIKLE (Schenectady, N.Y.)—Improvements in incandescent cathode devices. (*Assigned to the General Electric Co., New York.*)
- 1230874 June 26.—LEE DE FOREST (New York)—Metallic audions. (*Assigned to the De Forest Radio Telephone and Telegraph Co., New York.*)
- 1231489 June 26.—CHARLES E. CAMPBELL (Lynn, Mass.)—Improvement in spark-gaps.
- 1231528 June 26.—PEDER O. PEDERSEN (Fredericksberg, Denmark)—Generator for high-frequency currents. (*Assigned to the Federal Telegraph Co., California.*)

- 1231984 July 3.—HAROLD DE FOREST ARNOLD AND HAROLD W. NICHOLS (New Jersey)—Improved means for the prevention of interference in radio transmission. (*Assigned to the Western Electric Co., New York.*)
- 1233211 July 10.—FRANK P. FISHER AND HUGH DEHART (Radford, Virginia)—Device for telegraphing under water without the use of wire or metallic connections between the sending and receiving stations.
- 1233841 July 17.—ELMER E. BUTCHER (Interlaken, N.J.)—Improved means for receiving electrical oscillations. (*Assigned to the Marconi Wireless Telegraph Company of America, New York.*)
- 1235650 Aug. 7.—DAVID W. BROWN (New York)—Intensifier of high-frequency electric oscillations.
- 1235935 Aug. 7.—ARCHIBALD SHAW (Randwick, Sydney, Australia)—Rectifying spark-gap for high-tension alternating electrical currents.
- 1237015 Aug. 14.—WILLIAM C. BRINTON, JUN. (Kennett Square, Penn.)—Electrical condenser and process for making the same. (*Assigned to the Philips-Brinton Co., Pennsylvania.*)
- 1238869 Sept. 4.—GEORGE M. WRIGHT (London)—Valve receiver for wireless signals. (*Assigned to the Marconi Wireless Telegraph Company of America, New York.*)
- 1239592 Sept. 11.—JOHN HAYS HAMMOND, JUN. (Gloucester, Mass.)—Method of controlling a variable number of operating mechanisms by wireless impulses from a single station.
- 1239831 Sept. 11.—FREDERICK G. SIMPSON (Seattle, Washington)—Improved means for charging the condensers used in connection with wireless telegraph and telephone systems.
- 1239852 Sept. 11.—FREDERICK K. VREELAND (Montclair, N.J.)—Improvement in receivers of electrical impulses. (*Assigned to the Vreeland Apparatus Co., New York.*)
- 1240206 Sept. 18.—RAYMOND A. HEISING (East Orange, N.J.)—Improvements in oscillation generators. (*Assigned to the Western Electric Co., New York.*)
- 1240294 Sept. 18.—RICCARDO ARNO (Milan, Italy)—System for generating high-frequency currents.
- 1240721 Sept. 18.—FRANK F. HULTGREEN (Berkeley, Cal.)—Improvement in auxiliary spark gaps.
- 1240958 Sept. 25.—HAROLD P. DONLE (Belmont, Mass.)—Improved condenser. (*Assigned to the Connecticut Telephone and Electric Co., Connecticut.*)
- 1244150 October 23.—EZECHIEL WEINTRAUB (Boston, Mass.)—Method of changing resistance in a circuit and apparatus therefor. (*Assigned to the Submarine Signal Co., Portland, Maine.*)
- 1244697 Oct. 30.—JOHN R. CARSON (New York). Wireless telegraph system for the improvement of received signals and the elimination of static interference. (*Assigned to the American Telephone and Telegraph Co., New York.*)

- 1245135 Oct. 30.—JIM THOMPSON AND ROY J. THOMPSON (Elm Grove, California)—Improved detector for wireless signals.
- 1245146 Nov. 6.—FREDERICK K. VREELAND (Montclair, N.J.)—Method of transmitting and receiving high-frequency signal impulses. (*Assigned to the Vreeland Apparatus Co., New York.*)
- 1245266 Nov. 6.—GREENLEAF W. PICKARD (Amesbury, Mass.)—
& 1245267 Improvements in receivers for radiotelegraphy and telephony. (Division of Patent No. 1184376. *Assigned to the Wireless Specialty Apparatus Co., Boston, Mass.*)
- 1245445 Nov. 6.—CARL R. ENGLUND (East Orange, N.J.)—Apparatus and means for the wireless telephonic transmission of modulated high-frequency waves. (*Assigned to the Western Electric Co., New York.*)
- 1245702 Nov. 6.—EMILE GIRARDEAU AND JOSEPH BETHENOD (Paris)—Improvements in multiple spark gaps.
- 1246054 Nov. 13.—JOHN H. CLOUGH (Schenectady, N.Y.)—Improvement in enclosed arc devices. (*Assigned to the General Electric Co., New York.*)
- 1246420 Nov. 13.—PAUL J. HACKETT (Seattle, Washington)—High-power transmitting apparatus for wireless telephony.
- 1246626 Nov. 13.—DAVID G. McCAA (Lancaster, Penn.)—Improved apparatus for the production of oscillatory currents of high frequency and the emission of electromagnetic waves. (*Assigned to the McCaa Radio Co., Lancaster, Penn.*)
- 1247556 Nov. 20.—Apparatus for the production of high-frequency currents of electricity.
- 1248829 Dec. 4.—BURNS DICK (St. Louis, Miss.)—Condenser terminal and the method of forming the same. (*Assigned to the Wagner Electric Mfg. Co., St. Louis, Missouri.*)
- 1249274 Dec. 4.—EDWARD F. CHANDLER (Woodhaven, N.Y.)—System of accurately directing the course of torpedoes steered from a wireless controlling station. (*Assigned to the Chandler Development Co., New York.*)
- 1249482 Dec. 11.—GREENLEAF W. PICKARD (Amesbury, Mass.)—Receiver for radiotelegraphy and telephony. (*Assigned to the Wireless Specialty Apparatus Co., Boston, Mass.*)
- 1250385 Dec. 18.—CLARENCE H. TEALL (Detroit, Michigan)—Rotary spark gap machine for use in connection with wireless apparatus
- 1251378 Dec. 25.—HARACE HURM (Paris)—Crystalline or like detectors for electric waves.
- 1251388 Dec. 25th.—IRVING LANGMUIR (Schenectady, N.Y.)—System of connections for vacuum tubes of the incandescent cathode type. (*Assigned to the General Electric Co., New York.*)
- 1251440 Dec. 25.—MORTON SULIZER (Brooklyn, N.Y.)—Improved condenser switch. (*Assigned to the Western Electric Co., New York.*)

USEFUL DATA SECTION

THE section has completely justified itself in practice, and proved its utility to those for whose benefit it was compiled. Last year it underwent a thorough revision at the hands of Dr. Erskine Murray.

In view of the increasing amount of space taken up by other sections it has proved impossible to continue the development and expansion of this section *within the covers of the Year Book*; and we have, therefore, decided to publish a separate volume covering the Useful Data and Formulæ, together with other information on similar lines. This will be issued before the publication of the 1919 Year Book, and the present volume therefore contains them for the last time.

DEFINITIONS OF TERMS USED IN WIRELESS

(Compiled from the Report of the Committee of Standardization of the Institute of Radio Engineers and from other sources, Dr. J. ERSKINE MURRAY, D.Sc., F.R.S.E., M.I.E.E.)

DEFINITION OF TERMS.

NOTE.—Terms are generally arranged alphabetically according to the *noun* referred to.

1. AERIAL.—The system of conductors designed to radiate, or absorb electro-magnetic waves.

2. AERIAL CIRCUIT.—The circuit comprising the aerial conductors, the earth conductors, and all inductances and condensers connected between them, and the capacity aerial—earth within the limits outside of which radiation takes place.

3. AERIAL RESISTANCE.—(See Antenna Resistance).

4. ÆTHER.—See Ether.

5. ALTERNATING CURRENT.—One which reverses its direction periodically with time.

6. ALTERNATOR.—A rotating machine which transforms mechanical energy into electrical energy, producing at its terminals one or more alternating E.M.F.'s (single phase or polyphase).

7. AMMETER (HOT BAND : HOT WIRE).—An ammeter dependent for its indications upon the change in dimensions of an element which is heated by a current through it.

8. AMMETER, THERMO.—An instrument for measuring current, depending for its indications on the voltage generated at the terminals of a thermo junction heated either directly or indirectly by the current to be measured.

9. AMPLIFIER OR AMPLIFYING RELAY.—An instrument which modifies the effect of a local source of energy in accordance with the

variations of received energy; and, in general, produces a larger indication than could be had from the incoming energy alone.

10. **AMPLIFICATION, COEFFICIENT OF.**—The ratio of the useful effect obtained by the employment of the amplifier to the useful effect obtained without that instrument.

11. **AMPLITUDE.**—The maximum value of current or voltage attained during any half period of an alternating current or voltage is called the amplitude during that half period.

12. **ANGULAR VELOCITY.**—Of a periodic alternating current in radians per second equals 2π times the frequency in cycles per second.

13. **ANODE.**—(a) In an electrolytic cell. The conductor through the surface of which the current enters the liquid.

(b) In a primary cell. The metal (usually zinc) through which the current enters the electrolyte, also termed negative terminal.

(c) The terminal by which the current enters a cell or other apparatus, such as a vacuum tube, etc. (B.E.C.).

14. **ANTENNA.**—See Aerial.

15. **ANTENNA, DIRECTIVE.**—An antenna having the property of radiating a maximum of energy in one (or more) directions.

16. **ANTENNA, FLAT TOP.**—An antenna having horizontal wires at the top covering a large area.

17. **ANTENNA, HARP.**—An antenna having an approximately vertical section of large area and considerable width.

18. **ANTENNA, INVERTED L.**—A flat top antenna in which the leading down wires are taken from one end of the long narrow horizontal section.

19. **ANTENNA, LOOP.**—An antenna in which the wires form a closed circuit, part of which may be the ground.

20. **ANTENNA, PLAIN.**—An approximately vertical single wire.

21. **ANTENNA, T.**—A flat top antenna in which the horizontal section is long and narrow, the leading down wires being taken from the centre.

22. **ANTENNA, UMBRELLA.**—One whose conductors form the elements of a cone from the elevated apex of which the leading down wires are brought.

23. **ANTENNA RESISTANCE.**—An effective resistance which is numerically equal to the ratio of the power in the entire antenna circuit to the square of the R.M.S. current at a potential node (generally the ground).

NOTE.—Antenna Resistance includes :

Radiation resistance.

Ground resistance.

Radio frequency ohmic resistance of antenna and loading coil and shortening condensers.

Equivalent resistance due to corona, eddy currents, and insulator leakage.

24. **APERIODIC CIRCUIT.**—A circuit which has no definite time period, this being due either to its resistance being large enough to prevent natural oscillations occurring, or to its having no capacity or no inductance by which it can be tuned.

25. **ARC.**—"A luminous discharge of electricity through a gas in which the material of one or both the electrodes is volatilised and takes part in the conduction of the current, whether continuous or alternating" (B.F.C.). **ARC.**—The passage of an electric current of relatively high density through a gas or vapour the conductivity of which is mainly due to the electron emission from the self-heated cathode. Under present practical conditions the phenomena take place near atmospheric pressure (I.R.E.).

26. **ARC OSCILLATOR.**—An arc used with an oscillating circuit for the conversion of direct to alternating or pulsating current. The oscillations generated are classified as follows :

Class (1).—Those in which the amplitude of the oscillation circuit current produced is less than the direct current through the arc.

Class (2).—Those in which the amplitude of the oscillation circuit current is at least equal to the direct current, but in which the direction of the current through the arc is never reversed.

Class (3).—Those in which the amplitude of the initial portion of the oscillation circuit current is greater than the direct current passing through the arc, and in which the direction of the current through the arc is periodically reversed.

27. **ARRESTER, EARTH.**—A spark gap with a small gap and large sparking surfaces ; used to protect receiving apparatus from powerful discharges.

28. **ASYNCHRONOUS.**—"A term applied to an A.C. generator or motor, the speed of which has no fixed relation to the frequency of the current" (I.E.C.).

29. **ATMOSPHERIC ABSORPTION.**—That portion of the total loss of radiated energy due to atmospheric conductivity, reflection, and refraction.

30. **ATMOSPHERICS.**—Disturbances produced in the receiving circuits, caused by electrical action in the atmosphere or in the earth's surface. They are also known as "X's," "Strays," and in the U.S.A. as "Static."

31. **ATTENUATION (RADIO).**—This is the decrease, with distance from the radiating source, of the amplitude of the electric and magnetic forces accompanying (and constituting) an electro-magnetic wave.

32. **ATTENUATION, COEFFICIENT OF (RADIO).**—The coefficient, which, when multiplied by the distance of transmission through a uniform medium, gives the natural logarithm of the ratio of the amplitude of the electric or magnetic force at that distance to the initial value of the corresponding quantity.

33. **AUDIBILITY.**—The ratio of the telephone current variation producing the received signal to that producing a just audible signal, *i.e.*, one which permits the mere differentiation of dots and dashes.

The measurement of audibility is an arbitrary method for determining the relative loudness of telephone response in radio receivers, in which it is stated that a signal has an audibility of given value. The determination of the above ratio may be made by the non-inductive shunt-to-telephone method, except that a series resistance should be inserted to keep the main current constant, and that the shunt resistance should therefore be connected as a potentiometer.

34. **AUTO-JIGGER.**—See Jigger.

35. **AUTOMATIC RECEIVER.**—A receiver which records signals so they can be translated at any convenient time after reception.

36. **AUTOMATIC TRANSMITTER.**—A transmitter which has the usual operating key replaced by any mechanical telegraph sender, such as a Wheatstone transmitter.

37. **BALANCING AERIAL.**—An aerial used in duplex wireless telegraphy. It fills a purpose similar to that of the artificial line in duplex wire telegraphy.

38. **BATTERY.**—A primary or secondary cell for producing electric current or a collection of such units. A collection of condenser units.

39. **BEAT.**—When two oscillations of slightly different frequencies are impressed on an electrical circuit they periodically help and oppose each other. The result is an oscillation whose successive half periods gradually increase and decrease in amplitude with a frequency equal to the difference between the two impressed frequencies.

40. **BRUSH DISCHARGE.**—"A discharge having a feathery form, and consisting of an intermittent partial discharge which takes place from a conductor when the potential difference exceeds a certain limit, but is not high enough to cause the formation of a true spark or arc. It is always accompanied by a hissing or cracking sound" (I.E.C.). When such a discharge is being given off by a conductor the latter is said to be "Brushing."

41. **BRUSH OR CORONAL LOSSES.**—Those due to leakage convection electric currents through a gaseous medium.

42. **BUZZER.**—A small mechanism (usually electromagnetic) used for rapidly making and breaking an electric circuit. When connected in series with part of a circuit in which oscillations are possible it continually impulses the circuit, thereby producing oscillations which are convenient for testing purposes.

43. **CAGE CONDUCTOR.**—A group of parallel wires arranged as the elements of a long cylinder.

NOTE.—Any conducting element of an antenna may be a cage conductor.

44. **CAPACITY.**—That property of a material system by virtue of which it is capable of storing energy electrostatically.

The capacity of a system is dependent on its geometrical dimensions, its position relative to other conductors, and the dielectric constants of the surrounding media.

Capacity is measured by the ratio of the quantity of electricity stored to the potential difference at which it is stored.

A distinctive property of a capacity is that it permits the passage of electrical energy through it only in the form of displacement currents.

45. **CAPACITY, EFFECTIVE, OF AN ANTENNA.**—The effective capacity and effective inductance of an antenna at any oscillation frequency are the equivalent capacity and inductance values determined from the following fundamental equations:

$$\omega = \sqrt{\frac{1}{LC}} \quad \dots \quad (1)$$

where L = the total antenna inductance,

C = the total antenna capacity,

ω = the angular velocity of the free alternating currents in the antenna.

$$d = \pi R \sqrt{\frac{C}{L}} \quad \dots \quad (2)$$

$$\text{or} \quad d' = \pi R' \sqrt{\frac{C}{L}} \quad (2a)$$

where R' = series resistance inserted at the base of the antenna and
 d' = increased decrement resulting therefrom.

Solving (1) and (2a) for L and C , we have

$$L = \frac{\pi R'}{\omega d'} = \frac{R'}{6 \times 10^8 \times d'} \cdot \lambda \quad (\lambda \text{ in meters}).$$

$$C = \frac{d'}{R'} = \frac{d'}{6 \pi^2 \times 10^8 \times R'} \cdot \lambda \quad (\lambda \text{ in meters}).$$

Having the antenna inductance and capacity, the resistance R of the antenna can be determined from equation (2). This value of R satisfies the fundamental equation:

RI^2 = power absorbed by the antenna,
 where I = current measured at the base of the antenna.

NOTE.—The equation

$$I = \omega CE$$

(and also $E = \frac{\pi R'}{d'} \cdot I$)

defines an effective voltage E , which is the voltage approximately given by the equation. Energy per spark = $\frac{1}{2}CE^2$.

46. CATHODE.—See Kathode.

47. CENTRE OF CAPACITY OF AN ANTENNA.—See Form Factor, Note 2.

48. CHANGER, FREQUENCY.—A device delivering alternating currents at a frequency which is some multiple of frequency of the supply current.

49. CHANGER, WAVE.—A transmitting device for rapidly and positively changing the wave length.

50. CHARACTERISTIC CURVE.—A curve showing the variation of a property of a material or a piece of apparatus when submitted to a changing influence which produces that variation.

The characteristic curve of an arc or crystal shows the relation between the current produced and potential required to produce the current.

51. CHARACTERISTIC, DYNAMIC, OF A CONDUCTOR (for a given frequency and between given extremes of impressed E.M.F. and resultant current through the conductor).—This is the relation given by the curve obtained when the impressed E.M.F.'s are plotted as ordinates against the resultant currents as abscissas, both E.M.F.'s and currents varying at the given frequency and between the given extremes.

52. CHARACTERISTIC, STATIC, OF A CONDUCTOR.—This is the relation given by the curve plotted between the impressed electromotive force as ordinates and the resultant current through the conductor as abscissas, for substantially stationary conditions.

53. CHOKING COIL.—“A coil with so great a self-induction that its impedance depends chiefly on the self-induction rather than upon the resistance” (I.E.C.). Generally called a Reactance Coil in U.S.A.

54. CIRCUIT, CLOSED OSCILLATING.—A circuit in which the capacity and inductance in series, are localised substantially in different places, and which has very small power of radiating electromagnetic waves.

55. COEFFICIENT, ATTENUATION, RADIO.—See Attenuation.

56. COEFFICIENT OF AMPLIFICATION.—See Amplification.

57. COEFFICIENT OF COUPLING, INDUCTIVE.—The ratio of the effective mutual inductance of two circuits to the square root of the product of the effective self-inductances of each of these circuits.

58. CODE.—A system of conventional characters designed to represent letters by dots and dashes. The International Morse Code is official.

59. COHERER.—A form of detector (q.v.). An imperfect contact or collection of such contacts so arranged that when under the influence of an alternating potential it coheres and allows current from a local battery to pass and make some kind of signal. A device sensitive to radio frequency energy, and characterised by (1) a normally high resistance to currents at low voltages, (2) a reduction in resistance on the application of an increasing electromotive force, this reduction persisting until eliminated by the application of a restoring or disturbing mechanical force, and (3) the substantial absence of thermo-electric or rectifying action.

60. COMMUNICATION, RADIO.—The transmission of signals by means of electromagnetic waves originating in a constructed circuit.

61. COMPASS, RADIO.—A radio receiving device for determining the direction (or the direction and its opposite) in which maximum energy is received ; or

A radio transmitting device for determining the direction (or the direction and its opposite) of maximum radiation.

62. CONDENSER.—A material system possessing electrostatic capacity. Two conducting surfaces separated by a dielectric.

63. CONDENSER, AIR.—A condenser having air as its dielectric.

64. CONDENSER, COMPRESSED GAS.—A condenser having compressed gas as its dielectric.

65. CONDUCTOR, CAGE.—See Cage Conductor.

66. CONDUCTION CURRENT.—A transfer of electrical energy guided by a conducting medium.

67. CONTINUOUS CURRENT.—A term recommended by the I.E.C. to supersede "direct current" as a description of "an electric current in one direction and sensibly steady or free from pulsation. Abbreviated CC."

68. CONTINUOUS WAVES.—The term applied to waves radiated from an aerial in which oscillations are sustained. Continuous waves may have successive half periods of equal amplitude, or the amplitude may vary within small limits without detriment to their use for wireless telegraphy.

69. CONVECTION CURRENT.—A transfer of electrical energy by separate charged particles, unguided by any material medium.

70. CONVERTER, ROTARY.—A machine for converting electrical energy of one form of current to electrical energy of another form, such as from alternating current to continuous or *vice versa*.

71. CORONA.—See Brush or Coronal Losses.

72. COUNTERPOISE.—A system of electrical conductors forming one portion of a radiating oscillator the other portion of which is the antenna. In land stations, a counterpoise forms a capacitive connection to ground.

73. COUPLER.—An apparatus which is used to transfer radio frequency energy from one circuit to another by associating portions of these circuits.

74. **COUPLER, CAPACITIVE.**—An apparatus which, by electric fields, joins portions of two radio frequency circuits, and which is used to transfer electrical energy between these circuits through the action of electric forces.

75. **COUPLER, DIRECT.**—A coupler which magnetically joins two circuits having a common conductive portion.

76. **COUPLER, INDUCTIVE.**—An apparatus which by magnetic forces joins portions of two radio frequency circuits.

77. **COUPLING.**—The connection between two circuits enabling energy to be transferred from one to the other. The connection may be by magnetic linkage, electrostatic linkage, direct connection, or any combination of these.

78. **COUPLING, COEFFICIENT OF,** in inductively coupled system is the ratio of the mutual inductance of the two circuits to the square root of the product of the self-inductance of the circuits. The coefficient of coupling (κ) between two circuits tuned to the same frequency and then coupled, is also given by the formula :—

$$\kappa = \frac{\lambda_1^2 - \lambda_2^2}{\lambda_1^2 + \lambda_2^2}$$

where $\lambda_1 \lambda_2$ are the longer and shorter resulting natural wave-lengths of the coupled system.

79. **CRITICAL RESISTANCE.**—That resistance which is just sufficient to prevent free oscillation in an electrical circuit. If L inductance,

C Capacity, then Critical Resistance $= \sqrt{\frac{4L}{C}}$.

80. **CRYSTAL DETECTOR.**—A detector which uses the rectifying properties of the contact between a crystal and a metal surface or between two crystals.

81. **CURRENT, DAMPED ALTERNATING.**—An alternating current whose amplitude progressively diminishes. (Also called oscillating current.)

82. **CURRENT, FORCED ALTERNATING.**—A current, the frequency and damping of which are equal to the frequency and damping of the exciting electromotive force. See further, Current, Free Alternating.

NOTE 1.—During the initial stages of excitation, both free and forced currents co-exist.

83. **CURRENT, FREE ALTERNATING.**—The current following any transient electromagnetic disturbance in a circuit having capacity, inductance, and less than the critical resistance. See further, Resistance, Critical.

84. **CURVE, DISTRIBUTION, OF A RADIO TRANSMITTING STATION FOR A GIVEN DISTANCE.**—This is a polar curve the radii vectors of which are proportional to the field intensity of the radiation at that distance in corresponding directions. See also Compass, Radio.

NOTE 1.—The distribution curve depends, in general, not only on the form of the antenna, but also on the nature of the ground surrounding the station.

NOTE 2.—The distribution curve generally varies with the distance from the station.

85. **CURVE, RESONANCE, STANDARD.**—A curve the ordinates of which are the ratios of the square of the current at any frequency to the square of the resonant current, and the abscissas are the ratios of

the corresponding wave length to the resonant wave length; the abscissas and ordinates having the same scale.

86. CYCLOGRAM.—See Characteristic Dynamic.

87. CYCLOGRAPH.—An instrument for the production of cyclograms.

88. CYMOMETER.—A “wave-measurer.” See Wave-meter.

89. DAMPING.—The diminution of energy in an electrical circuit resulting from loss of energy.

90. DAMPING FACTOR (of a simple circuit).—The ratio of the effective resistance of that circuit to twice the effective inductance (the reciprocal of a time). This term applies only to circuits capable of carrying free alternating currents.

91. DECREMENT.—See Decrement, Linear, and Logarithmic.

92. DECREMENT, LINEAR, OF A LINEARLY DAMPED ALTERNATING CURRENT.—This is the difference of successive current amplitudes in the same direction divided by the larger of these amplitudes.

NOTE.—Let I_n and I_{n+1} be successive current amplitudes in the same direction of a linearly damped alternating current.

Then, the linear decrement, which is not a constant but varies with the amplitude,

$$b = \frac{I_n - I_{n+1}}{I_n}$$

Also: $I_t = I_0 (1 - bft)$,

where I_0 = initial current amplitude,

I_t = current amplitude at time t ,

f = frequency of alternating current.

$b = (I_0 - I_1) / I_0$.

93. DECREMENT, LOGARITHMIC, OF AN EXPONENTIALLY DAMPED ALTERNATING CURRENT.—This is the logarithm of the ratio of successive current amplitudes in the same direction.

NOTE.—LOGARITHMIC DECREMENTS ARE STANDARD FOR A COMPLETE PERIOD OR CYCLE.

Let I_n and I_{n+1} be successive current amplitudes in the same direction.

d = logarithmic decrement,

Then, $d = \log_e \frac{I_n}{I_{n+1}}$, where $e = 2.718 +$.

94. DECREMETER.—An instrument for measuring the logarithmic decrement of a circuit or of a train of electromagnetic waves.

95. DETECTOR.—That portion of the receiving apparatus which, connected to a circuit carrying currents of radio frequency, and in conjunction with a self-contained or separate indicator, translates the radio frequency energy into a form suitable for operation of the indicator. This translation may be effected either by the conversion of the radio frequency energy, or by means of the control of local energy by the energy received.

96. DEVICE, ACOUSTIC RESONANCE.—A device which utilizes in its operation resonance to the audio frequency of the received signals.

97. DIELECTRIC.—Any medium which will only allow of electric conduction to a small or negligible extent.

98. **DIELECTRIC CONSTANT** (or Specific Inductive Capacity) of a medium. The ratio of the capacity of a condenser having that medium as a dielectric to the capacity of a condenser having a vacuum dielectric, but otherwise identical. (The dielectric constant of air is substantially unity, and therefore for all practical purposes air may be used in place of the vacuum in the comparison condenser.)

99. **DIELECTRIC HYSTERESIS**.—That lagging property of a dielectric which is measured by the energy lost when the rising and falling (displacement current)—(Voltage) characteristics (dynamic) are not identical.

100. **DIELECTRIC HYSTERETIC CONSTANT** of a given dielectric. The value of the dielectric hysteresis per cycle per unit of potential gradient applied to the dielectric.

101. **DIFRACTION** is the deviation of the direction of propagation of a wave from the normal to the wave front at the point where the waves pass the edge of an obstruction. The amount of diffraction depends on the wave-length and increases with increase of wave-length.

102. **DIPLEX TELEGRAPHY** is the simultaneous transmission or the simultaneous reception of two messages at the same station.

103. **DIRECT COUPLING**.—When one circuit is linked to another in such a way that a portion of the one forms part of the other they are said to be direct-coupled. An example is provided in the auto-jigger (*vide* Jigger), in which a portion of the inductance is common to two circuits.

104. **DIRECTION FINDER, WIRELESS**.—A receiving instrument which, in combination with a special aerial system, enables the direction of the transmitting station to be determined.

105. **DISC DISCHARGER, ASYNCHRONOUS**.—A disc discharger the speed of which has no fixed relation to the frequency of the current charging the condenser which it discharges.

106. **DISC DISCHARGER, SYNCHRONOUS**.—A disc discharger usually directly coupled to the alternator supplying power to the condenser. It may discharge the condenser, one, two, three, or more times during a half-period; or every one, two, or more half-periods. The usual practice is to discharge once every half-period, at the moment when the condenser potential is a maximum, and the alternator current zero.

107. **DISCHARGER**.—That piece of apparatus in the primary oscillating circuit at which the spark takes place.

108. **DUPLEX TELEGRAPHY**.—Is the transmission of a message and the reception of a message simultaneously at the same station.

109. **DISPLACEMENT CURRENT**.—The electrical condition within a dielectric region of varying electric stress. It produces the same external electric and magnetic effects as the equivalent conduction current.

110. **EARTH CONNECTION, OR "EARTH"**.—The connection to the earth which in most systems forms the lower extremity of the Aerial System (q.v.). It usually takes the form of a system of metal plates or wires, or a combination of both, more or less deeply buried in the ground. (U.S. equivalent, Ground.)

111. **EDDY CURRENTS**.—Those induced in conducting masses by external varying magnetic fields, the location of these currents being

primarily determined by the position of the fields and not by the configuration of the conducting mass. (That is, the conducting mass is not specially arranged to provide perfectly well-defined circuits.) Such parasitic currents are also called Foucault currents.

112. **ELECTRIC POTENTIAL** is defined as the work done in carrying a unit charge of electricity from infinity to the point considered. (See **Electromotive Force**.)

113. **ELECTRIC STRESS**.—The cause of the electrically strained condition in the medium between two regions which are at different potentials.

114. **ELECTROMAGNETIC WAVE**.—A progressive disturbance characterised by the existence on the wave front of electric and magnetic forces acting in directions which are perpendicular to each other and to the direction of propagation of the wave.

115. **ELECTROMOTIVE FORCE**.—The force which tends to displace electricity, and is equal to the difference of potential between the points considered.

116. **ETHER**.—The medium assumed by electromagnetic theory in order to explain the translation of energy at finite speed by electromagnetic waves.

117. **EXCITATION, IMPULSE**.—A method of producing free alternating currents in an excited circuit in which the duration of the exciting current is short compared with the duration of the excited current.

NOTE.—The condition of short duration implies that there can be no appreciable reaction between the circuits.

118. **FACTOR, DAMPING**.—The product of the logarithmic decrement and the frequency of an exponentially damped alternating current.

Let I_0 = initial amplitude,

I_t = amplitude at the time t ,

ϵ = base of Napierian logarithms (2.718+)

α = damping factor.

Then, $I_t = I_0 \epsilon^{-\alpha t}$.

119. **FACTOR, FORM**.—The form factor of a symmetrical antenna for a given wave length is the ratio of the algebraic average value of the R.M.S. currents measured at all heights to the greatest of these R.M.S. currents.

NOTE 1.—For a given R.M.S. current at the base of the antenna, the field intensity at distant points is proportional to the form factor times the height of the antenna.

NOTE 2.—The effective height (height of centre of capacity) is equal to the form factor times the actual height of the antenna.

NOTE 3.—The limiting values of the form factor for various types of antennas are as follows:

	LINEAR OR VERTICAL ANTENNA	FLAT TOP UMBRELLA ANTENNA
Long Waves	Lower Limit, $1/2$	Upper Limit, 1
Fundamental	Lower Limit, $2/\pi$	

NOTE 4.—The form factor varies in a given antenna at various wave lengths due to variation of the current distribution.

120. FORCED 'ALTERNATING CURRENT.—One produced in *any* circuit by the application of an alternating electromotive force.

121. FREE ALTERNATING CURRENT.—That produced by an isolated electrical displacement in a circuit having capacity, inductance, and less than the critical resistance.

122. FREQUENCY.—A term used in connection with any form of rhythmical motion or rhythmical change, denoting the number of complete movements or changes in a given time—usually a second.

123. FREQUENCIES, AUDIO (ABBREVIATED A.F.).—The frequencies corresponding to the normally audible vibrations. These are assumed to lie below 10,000 cycles per second.

124. FREQUENCIES, RADIO (ABBREVIATED R.F.).—The frequencies higher than those corresponding to the normally audible vibrations, which are generally taken as 10,000 cycles per second. See also Frequencies, Audio.

NOTE.—It is not implied that radiation cannot be secured at lower frequencies, and the distinction from audio frequencies is merely one of definition based on convenience.

125. FREQUENCY CHANGER.—See Changer, Frequency.

126. FREQUENCY, GROUP.—The number per second of periodic changes of amplitude or frequency of an alternating current.

NOTE 1.—Where there is more than one periodically recurrent change of amplitude, or frequency, there is more than one group frequency present.

NOTE 2.—The term "group frequency" replaces the term "spark frequency."

127. FREQUENCY METER.—An instrument which indicates frequency.

128. FREQUENCY TRANSFORMER.—See Changer, Frequency.

129. FUNDAMENTAL FREQUENCY.—The lowest frequency to which an electrical circuit will resonate.

130. FUNDAMENTAL OF AN ANTENNA.—This is the lowest frequency of free oscillations of the unloaded antenna. (No series inductance or capacity.)

131. FUNDAMENTAL WAVE LENGTH.—The wave length corresponding to the lowest free period of any oscillator.

132. GAP, MICROMETER.—A device for protecting any apparatus from excessive potentials, and consisting of a short gap designed for fine adjustment.

133. GROUND.—A conductive connection to the earth.

134. GROUP FREQUENCY.—The number of distinguishable alternating current groups occurring per second in an electrical circuit.

NOTE 1.—The group referred to above is, in general, mainly a free alternating current which is substantially damped to extinction before the beginning of the following group or train.

NOTE 2.—The pitch of the note in the receiving station is, in general, determined by the group frequency at the transmitting station.

NOTE 3.—The term "Group Frequency" replaces the term "Spark Frequency."

135. HARMONIC FREQUENCY.—The harmonics of any particular frequency are generally understood to be all higher frequencies which are odd or even multiples of the said frequency. An electrical oscillator which has uniformly distributed inductance and capacity (a straight wire nearly fulfils these conditions) will resonate to any odd or even multiple of its fundamental frequency according to whether one end is earthed or not. If the inductance and capacity are not uniformly distributed the circuit may resonate to a number of frequencies higher than its fundamental, but these higher frequencies will not necessarily bear any whole multiple relation to the fundamental frequency.

136. HEIGHT, EFFECTIVE, OF AN ANTIENNA.—See Factor, Form ; Note 2.

137. HETERODYNE.—A receiver for continuous waves using the principle of reaction between locally generated oscillations and the received oscillations in order to produce beats.

138. HIGH-FREQUENCY RESISTANCE.—The resistance offered by a conductor to the passage of high-frequency currents.

It is always greater than the resistance for direct current because of the unequal current distribution over a section of the conductor when carrying high-frequency currents.

139. IMPEDANCE.—Total opposition to current flow in a circuit in which the current is varying, and is numerically equal to the square root of the sum of the squares of the ohmic resistance and the total reactance of the circuit.

140. INDUCTANCE.—That property of a material system by virtue of which it is capable of storing energy electromagnetically.

The inductance of a system is dependent upon its geometrical dimensions and the permeability of the surrounding media. In hysteresis-free circuits inductance is measured by the ratio of the energy stored in the magnetic field surrounding a current-carrying conductor to the square of the current in that conductor, for stationary conditions. In any circuit, it may be measured by the interlinkage with the system itself of magnetic lines of force due to unit current passing through the system. An alternative method involves the measurement of the counter-electromotive force at the terminals of the given conductor when the current through the conductor changes at the rate of one unit of current per second. In hysteresis-free circuits these three methods of measurement yield identical results.

141. INDUCTANCE, EFFECTIVE, OF AN ANTENNA.—See Capacity, Effective, of an Antenna.

142. INDUCTION COIL.—A piece of apparatus which makes use of the phenomena of induction to transform an intermittent current of comparatively low voltage to an intermittent current of high voltage.

143. INDUCTIVE COUPLING.—Two circuits so arranged that some of the lines of force from one passing through the other circuit are inductively coupled.

144. IMPULSE EXCITATION.—See Excitation, Impulse.

145. INTERFERENCE.—The interaction of two alternating currents or of electro-magnetic waves under conditions such that they oppose each other.

146. INTERFERENCE (IN RECEPTION).—The introduction of undesired signals, either from other stations or from Atmospherics (q.v.), into a receiver which is engaged in the reception of a message; often referred to as “jamming.”

147. INTERFERENCE, WAVE (IN RADIO COMMUNICATION).—The reinforcement or neutralisation of waves arriving at a receiving point along different paths from a given sending station; (to be distinguished from ordinary or station interference, which is the simultaneous reception of signals from two or more stations).

148. IONISATION OF A GAS.—The breaking away from the molecules of the ions contained in them, thus rendering the gas conductive.

149. JAMMING.—See Interference (in Reception).

150. JIGGER.—The transformer used in coupled circuits. The primary and secondary form part of the primary and secondary circuits respectively. If the transformer has part of the winding common to both primary and secondary, it is called an Auto-Jigger.

151. KATHODE.—“(a) In an electrolytic cell. The conductor through the surface of which the current leaves the electrolyte.

“(b) In a primary cell. The conductor (generally carbon) through which the current leaves the electrolyte.

“(c) The electrode by which the current leaves a cell or other apparatus, such as a vacuum tube” (B.E.C.).

152. KEY (MANIPULATING) (OPERATING).—A switch arranged for easy manual operation.

153. KEY, RELAY.—See Relay Key.

154. LENGTH, WAVE.—See Wave Length.

155. LINE OF FORCE.—A curve described in an electric or magnetic field such that the direction of the electric or magnetic force at any point of that curve is a tangent to the curve.

156. LOSSES, BRUSH OR CORONA.—See Brush or Corona Losses.

157. MAGNETIC FIELD INTENSITY.—The number of lines of force per unit area.

158. MAGNETIC FORCE.—At a point. The force acting on a unit magnetic pole placed at that point. It is numerically equal to the field intensity in a medium of unit permeability.

159. MAGNETIC HYSTERESIS.—That property of a magnetic medium which is measured by the energy losses when the rising and falling (magneto-motive force—induction), *i.e.* ($H-B$), dynamic characteristics are not identical.

160. MAGNETOMOTIVE FORCE.—A force tending to produce a magnetic flux.

161. MAGNETIC DETECTOR (MARCONI'S).—A detector of oscillations depending on the effect on the hysteresis of iron.

162. MICROPHONE.—A variable resistance, usually in the form of an electrical contact, whose resistance is varied with and in a proportional manner to the movement or pressure of one part. Thus if the movement or pressure is produced by sound waves acting on a diaphragm which is connected to the moving member of the microphone, an electrical current will be produced in the circuit containing

the microphone and a battery, whose amplitude varies in a similar manner to the movement of the diaphragm.

163. **MUTUAL INDUCTANCE** of two circuits, each on the other, is that portion of the inductance of one due to the magnetic field common to both.

164. **NATURAL FREQUENCY**.—Is the frequency with which a circuit will oscillate when supplied with energy and then left to itself. If

R = resistance

L = inductance

C = capacity

N = frequency per second

$$\text{then } N = \frac{1}{2\pi} \sqrt{\frac{1}{LC} - \frac{R^2}{4L^2}}$$

165. **NOTE OR TONE TUNING**.—A receiver is tuned to the note of the transmitter when a circuit or part of the indicator is designed to resonate to the spark frequency.

166. **OSCILLATIONS**.—See alternating Currents, Free and Forced, also Current, Damped Alternating.

167. **OSCILLATOR, ARC**.—See Arc Oscillator.

168. **OSCILLOGRAPH**.—"An apparatus for observing or recording quickly varying currents or potential differences" (B.E.C.).

169. **PERIOD, PERIODIC TIME**.—"Any varying quantity which repeats its values regularly at equal time-intervals is said to be periodic, and the time-interval of one repetition is called the periodic time or period" (B.E.C.).

170. **PERMEABILITY** of a medium.—The ratio of the magnetic flux density produced in that medium by a given magnetomotive force to the magnetic flux density produced by the same magnetomotive force in vacuum (or, for practical purposes, in air).

171. **PHASE**.—"(*a*) In an operation which recurs periodically the stage or state to which the operation has proceeded.

"(*b*) In an operation which recurs periodically the fraction of the whole period which has elapsed, measured from some fixed origin" (B.E.C.).

172. **PHASE DIFFERENCE**.—"The difference of phase (usually reckoned in time or in angle) between two periodic quantities which vary harmonically. Each of the circuits of a polyphase apparatus is sometimes called a phase" (B.E.C.).

173. **PLAIN AERIAL**.—An early form of transmitter in which the spark gap was placed directly in series with aerial and earth, so that the only condenser in which the energy of the transmitter could be stored was the capacity of the aerial to earth.

The term is also applied to the receiving circuit when the detector is placed directly in series with the receiving aerial and earth.

174. **POLARISATION** of a wave.—A wave is said to be plane polarised when its electric and magnetic displacements are propagated on the same plane.



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When the plane of the electric and magnetic displacement rotates uniformly with time, the waves are said to be circularly or elliptically polarised.

Such waves result from the compounding of two plane polarised waves having the same frequency and line of propagation but different relative phases and polarised in different planes.

175. **POTENTIOMETER.**—An instrument for adjusting at will the potential between any two parts of a circuit.

An instrument for measuring potential difference.

176. **POTENTIAL.**—See Electrical Potential.

177. **POWER.**—The amount of work done in unit time.

178. **POWER, APPARENT.**—In an alternating electric circuit this is the product volts \times ampères.

179. **POWER FACTOR.**—"The ratio of the watts to the volt-ampères. In the case of voltage and current of sine form the power factor is $\cos \phi$ " (B.E.C.). In an oscillating circuit $\cos \phi = \pi$ where δ is the decrement.

180. **QUENCHED SPARK.**—A spark whose duration is shortened by conditions at the discharger designed to rapidly increase the resistance at the spark gap is said to be "quenched."

181. **RADIATION RESISTANCE.**—The resistance which multiplied by the square of the R.M.S. current in the aerial equals the energy lost by the aerial in radiation.

182. **RADIATION, SUSTAINED.**—See Waves, Sustained.

183. **RADIOGRAM.**—A telegram sent by radio.

184. **TO RADIOGRAPH (VERB).**—To send a radiogram.

185. **RADIO TELEPHONE.**—An apparatus for the transmission of speech by radio.

186. **RADIOPHONE (NOUN).**—A telephoned message sent by radio.

187. **TO RADIOPHONE (VERB).**—To send a radiophone.

188. **REACTANCE** of a circuit is a function of the inductance, capacity, and the impressed frequency.

An inductance has reactance $2 \pi \times \text{frequency} \times \text{inductance}$.

A capacity has reactance

$$\frac{1}{2 \pi \times \text{frequency} \times \text{capacity}}$$

An inductance in series with a capacity has reactance equal to the sum of the reactance of the inductance and the reactance of the condenser.

Under conditions of resonance in a circuit the reactance of the capacity neutralises the reactance of the inductance and the resulting reactance is zero.

189. **RECTIFIER.**—An apparatus for converting alternating or oscillating currents into continuous current, or into pulses of unidirectional current. **RECTIFIER, ELECTRON.**—A device for rectifying an alternating current by utilizing the approximately unilateral conductivity between a hot cathode and a relatively cold anode in so high a vacuum that a pure electron current flows between the electrodes.

190. RECTIFIER, GAS.—An electron rectifier containing gas which modifies the internal action by the retardation of the electrons or the ionization of the gas atoms.

191. REFLECTION OF ELECTROMAGNETIC WAVES.—(1) When a wave reaches the interface between two media of different dielectric constants its energy does not wholly pass from one medium to the other, but in part remains in the first medium in a reflected wave which travels back from the interface. When the dimensions of the separating surface are large compared with the wave-length the laws of reflection of electromagnetic waves are in general the same as for light.

(2) When waves are being guided by a conductor, such as a wire which has a certain inductance and capacity per unit length, any abrupt change in the value of these constants (such as are produced by inserting an inductance coil, or occur at the end of the wire) causes the production of alternating potentials which result in a wave which travels along the wire in the opposite direction. This second wave is also called a reflected wave.

192. REFRACTION.—The change in the direction of a wave propagation when passing from one medium to another.

193. RELAY.—An apparatus by means of which a current, too small to perform a required work, is made to control a larger and adequate current.

194. RELAY, ELECTRON.—A device provided with means for modifying the pure electron current flowing between a hot cathode and a relatively cold anode placed in as nearly as possible a perfect vacuum.

These means may be, for example, an electric control of the pure electron current by variation of the potential of a grid interposed between the cathode and the anode.

195. RELAY, GAS.—An electron relay containing gas which modifies the internal action by the retardation of the electrons or the ionization of the gas atoms.

196. RELAY KEY.—An electrically operated key. See further, Key.

197. RESISTANCE.—The measure of that property of a conductor by the action of which electrical energy is transformed into heat in that conductor. It is numerically equal to the ratio of the heat energy liberated per second, measured in watts, to the square of the current in the circuit, for stationary conditions; it is also equal to the ratio of the applied electromotive force to the resulting current, both being constant.

198. RESISTANCE, ANTENNA.—See Antenna Resistance.

199. RESISTANCE, CRITICAL, OF A CIRCUIT.—That resistance which determines the limiting condition at which the oscillatory discharge of a circuit passes into an aperiodic discharge.

200. RESISTANCE, EFFECTIVE, OF A SPARK.—The ratio of the power dissipated by the spark to the mean square current.

201. RESISTANCE, RADIATION.—This is the ratio of the total energy radiated (per second) by the antenna to the square of the R.M.S. current at a potential node (generally the ground connection).
e further, Antenna, Resistance.

202. RESISTANCE, RADIO FREQUENCY.—This is the ratio of the heat produced per second in watts to the square of the R.M.S. current (R.F.) in amperes in a conductor.

203. RESONANCE.—Resonance of a circuit to a given exciting alternating E.M.F. is that condition due to variation of the inductance or capacity in which the resulting effective current (or voltage) in that circuit is a maximum.

NOTE 1.—Instead of varying the inductance and capacity of a circuit the frequency of the exciting field may be varied. The condition of resonance is determined by the frequency at which the current (or voltage) is a maximum.

NOTE 2.—The resonance frequency corresponds the more accurately to the frequency of the free oscillations of a circuit, the lower the damping of the exciting alternating field and of the excited circuit.

A circuit will resonate to an impressed frequency when the reciprocal of 2π times the square root of the product of inductance and capacity is equal to the impressed frequency and provided that its resistance is less than the critical resistance. Under conditions of resonance the amplitudes of successive half-periods of the resultant current gradually increase to a maximum which is dependent only on the impressed electromotive force and the resistance of the circuit including radiation.

204. RESONANCE, ACOUSTIC DEVICE.—See Device, Acoustic Resonance.

205. RESONANCE CURVE.—A curve showing the relation between the current induced in an oscillatory circuit and the inducing frequency.

206. RESONANCE, SHARPNESS OF.—See Tuning, Sharpness of.

207. ROOT-MEAN-SQUARE VALUE.—R.M.S. value of an alternating or oscillating current or voltage is the value given by the square root of the mean of the squares of the successive values throughout the half-period.

In a current or voltage of strict sine-wave form (sinusoidal) the R.M.S. value is equal to the maximum multiplied by .707—i.e., $(1/\sqrt{2})$. The R.M.S. value is also called the effective or virtual value.

208. SELECTIVITY.—The power of a receiving system to discriminate between a number of simultaneous signals.

209. SELF-INDUCTANCE of a circuit.—That portion of the inductance which is due to the magnetic field produced by the current in that circuit. See also Inductance.

210. SHARPNESS OF TUNING.—The measure of the rate of diminution of current in transmitters and receivers with detuning of the circuit which is varied.

If d_1 is the decrement of the free alternating current in the circuit and d_2 the decrement of the exciting E.M.F., then the sharpness of

tuning is arbitrarily defined as $\frac{\pi}{d_1 + d_2}$.

211. SHOCK EXCITATION.—A name given to the method of exciting oscillations in the aerial circuit by a sudden and very short transference of energy from another circuit.

212. SKIN EFFECT OF VARYING CURRENTS.—The non-uniform current density through the cross-section of the conductor. It is greatest at the surface and least at the centre.

213. SPARK.—An electrical discharge across a gap. It may consist of one discharge in either direction, but generally consists of a number of rapid oscillatory discharges.

214. SPECIFIC INDUCTIVE CAPACITY.—See Dielectric Constant.

215. STATIC.—Disturbances caused by atmospheric charging of the antenna.

NOTE.—When it is definitely known that disturbances are due to atmospheric charging of the antenna, the word "Static" shall be used. In general, disturbances shall be called "Strays."

216. STRAYS.—Electromagnetic disturbances set up by distant charges.

217. SYNTONY AND SYNTONISATION.—The adjustment of one circuit to another, or of one transmitter taken as a whole to one receiver taken as a whole, in such a way that their time-periods are the same and waves of a different time-period produce little or no effect on the system.

218. TELEGRAPHY, RADIO.—The art of sending and receiving radiograms.

219. TELEPHONY, RADIO.—The art of sending and receiving radiophones.

220. TICKER, TIKKER.—A rapid make-and-break device used in conjunction with a resonant circuit and a pair of telephones as a receiver for continuous waves. It discharges the condenser of the resonant circuit at every make. The speed of the make-and-break device has no relation to the wave frequency.

221. TONE WHEEL.—A high-speed commutator used as a receiver for continuous waves. It is run at a speed slightly different from the synchronous speed for the wave frequency and in effect converts the high-frequency current into a current of audible frequency.

222. TRAIN OF WAVES.—The waves produced by one discharge of the primary condenser in a spark circuit.

223. TRANSFORMER.—A stationary induction apparatus for transferring energy from one circuit to another by the medium of magnetic energy.

It may or may not transform the current into another current at different potential. In present radio practice the term should be restricted to audio frequency transformers. See Frequency, Audio.

224. TRANSMISSION, DIPLEX.—See Diplex Transmission.

225. TUNER.—An apparatus made in a convenient form, which in conjunction with a detector provides all necessary circuits and adjustments for selective tuning.

226. TUNING.—The process of securing the maximum indication by adjusting the time period of a driven element. See Resonance.

227. TUNING, SHARPNESS OF.—See Sharpness of Tuning.

228. UNDAMPED WAVES.—See Continuous Waves.

229. VACUUM TUBE, THREE ELECTRODE.—As examples see Relays, Electron and Gas.

230. VACUUM TUBE, TWO ELECTRODE.—As examples see Rectifiers, Electron and Gas.

231. VALVE, FLEMING.—A detector for oscillations. It depends on the rectifying properties of the ionised space between a hot filament and a cold electrode in an exhausted vessel.

232. WAVES, ELECTROMAGNETIC.—A periodic electromagnetic disturbance progressive through space.

233. WAVE LENGTH.—Twice the distance (taken in the line of propagation of the wave) between two successive points of zero disturbance; or the distance between two consecutive maxima, of the same sign. The wave length is numerically equal to the velocity of the waves divided by the frequency.

234. WAVE LENGTH (OF AN ELECTROMAGNETIC WAVE).—The distance in metres between two consecutive maxima of the same sign. The wave length is numerically equal to the velocity of the waves (3×10^{10} cms. per second) divided by their frequency.

235. WAVE LENGTH, FUNDAMENTAL.—See Fundamental Wave Length.

236. WAVE LENGTH, NATURAL.—In a loaded antenna (that is, with series inductance or capacity) the natural wave length corresponds to the slowest free oscillation.

237. WAVE CHANGER.—See Changer, Wave.

238. WAVE METER.—A radio frequency measuring instrument calibrated to read wave lengths.

239. WAVES, SUSTAINED.—Waves radiated from a conductor in which an alternating current flows.

240. WAVE TRAIN.—see Train of Waves.

DICTIONARY OF TECHNICAL TERMS

Specially Compiled for the "Wireless Year-Book" under the supervision of Dr. ERSKINE MURRAY,
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ENGLISH.	FRENCH.	ITALIAN.	SPANISH.	GERMAN.
Accumulator batteries . . .	Batterie d'accumulateurs . . .	Batterie di accumulatori . . .	Acumuladores, Baterias de . . .	Accumulatoren Batterie . . .
Aerial, balancing . . .	Antenne de compensation . . .	Antenna di compensazione . . .	Antena compensadora . . .	Wage Antenne . . .
Aerial, directional . . .	Antenne dirigée . . .	Antenna dirigibile . . .	Antena dirigida . . .	Gerichtete Antenne . . .
Aerial, direction-finder . . .	Antenne réception dirigée . . .	Antenna, rivelatrice della direzione . . .	Antena para busca de direcciones . . .	Antenne, zur Entdeckung der Richtung . . .
Aerial, horizontal . . .	Antenne horizontale . . .	Antenna orizzontale . . .	Antena horizontal . . .	Horizontaler Luftleiter . . .
Aerial, receiving . . .	Antenne de réception . . .	Antenna di ricezione . . .	Antena de recepción . . .	Empfangsdraht . . .
Aerial, transmitting . . .	Antenne d'émission . . .	Antenna di trasmissione . . .	Antena de transmisión . . .	Geberdraht (Sendeluftleiter) . . .
Aerial, umbrella . . .	Antenne en parapluie . . .	Antenna a forma di ombrella . . .	Antena de paragua en forma . . .	Schirmnetz . . .
Ammeter, a.c. . .	Ampermètre pour courant alternatif . . .	Amperometro per corrente alternata . . .	Amperímetro, c.a. . .	Wechselstromampere-meter . . .
Ammeter, d.c. . .	Ampermètre pour courant continu . . .	Amperometro per corrente continua . . .	Amperímetro, c.c. . .	Gleichstromampere-meter . . .
Ammeter, hotwire . . .	Ampermètre à fil chaud . . .	Amperometro a filo caldo . . .	Amperímetro térmico . . .	Hitzdrahtampere-meter . . .
Ammeter, moving coil . . .	Ampermètre d'Arsonval . . .	Amperometro a bobina mobile . . .	Amperímetro de bobina móvil . . .	D'Arsonvalscher Ampere-meter . . .
Angle divider . . .	Diviseur d'angle . . .	Divisore di angoli . . .	Divisor de Angulo . . .	WinkelTrennungs-Apparat . . .
Antenna . . .	Antenne . . .	Antenna . . .	Antena . . .	Luftleiter (Antenne) . . .
Antenna, horizontal extension of . . .	Branche horizontale de l'antenne . . .	Fili orizzontali dell' antenna . . .	Antena, Prolongación horizontal de la . . .	Horizontale Verlängerungs-drahte des Luftleiters . . .
Antenna, T-shaped . . .	Antenne en T . . .	Antenna a forma di T . . .	Antena en forma de T . . .	T. förmige Antenne . . .
Antenna, extended shaped . . .	Antenne en T, à branches horizontales prolongées . . .	Antenna a forma di T, allungata . . .	Antena en forma de T, prolongada . . .	Verlängerte T. Luftleiter . . .
Apparatus, receiving . . .	Appareils de réception . . .	Apparecchi di ricezione . . .	Aparatos receptores . . .	Empfänger . . .
Apparatus, transmitting . . .	Appareils de transmission . . .	Apparecchi di trasmissione . . .	Aparatos transmisores . . .	Sender . . .
Arrester, earth terminal . . .	Eclateur de mise à terre . . .	Morsetto per presa di terra . . .	Espacio de chispa de tierra . . .	Unterbrochener Erdschluss . . .
Arrester, lightning . . .	Paratoudre . . .	Dispositivo scaricafulmine . . .	Pararrayos . . .	Blitzschutz . . .
Atmospherics . . .	Perturbations atmosphériques . . .	Perturbazioni atmosferiche . . .	Perturbaciones atmosféricas . . .	Luftstoeungen . . .
Battery of Leyden jars . . .	Batterie de bouteilles de Leyde . . .	Batteria di bottiglie di Leida . . .	Bateria de Botellas de Leyden . . .	Batterie Leydener Flaschen . . .

Blower, electric motor	Soufflerie à moteur électrique	Ventilatore ad azionamento elettrico	Motor soprador or Ventilador eléctrico	Gebläse mit Elektrischen Antrieb
Busbars, main-	Barres omnibus principales	Barre collettrici principali	Barras colectoras principales	Haupt Sammelschienen
Building, station-	Bâtiment du poste radio-télégraphique	Fabbricato della stazione	Edificio de la estación	Stationhaus
Buzzer	Vibrateur	Vibratore	Zumbador	Summer
Buzzer, practice	Vibrateur d'apprentissage	Cicala per la pratica della ricezione a udito	Zumbador para práctico	Übungssummer
Capacity	Capacité	Capacità	Capacidad	Aufnahmefähigkeit
Cart, radiotelegraph	Voiture radiotélégraphique	Carro radiotelegrafico	Carro de radiotelegrafia	Funkenkarten
Change of connections for receiving	Commutation pour la réception	Commutazione per ricezione	Cambio de conexiones para la recepción	Umschaltung auf Empfangen
Change of connections for transmitting	Commutation pour la transmission	Commutazione per trasmissione	Cambio de conexiones para la transmisión	Umschaltung auf Senden
Chokes, air core protecting	Bobine de réactance sans noyau de fer	Bobine di protezione a nucleo d'aria	Bobinas de reactancia, protectoras, de núcleo de aire	Impedanzspulen für hohe Frequenz mit Luftkern
Choking coil	Bobine d'impédance	Rocchetto d'autoinduzione	Bobina de reactancia	Drosselspule
Circuit breaker and closer.	Disjoncteur et joncteur automatique	Interruttore	Interruptor con apertura y cierre automáticos	Strom - unterbrecher und Strom-schliesser
Circuit, closed oscillating	Circuit oscillant fermé	Circuito oscillante chiuso.	Circuito oscilante cerrado	Geschlossener Erregerkreis
Circuit, intermediate	Circuit intermédiaire	Circuito intermedio	Circuito intermedio	Zwischenkreis
Circuit, open radiating	Circuit radiant ouvert	Circuito radiante aperto	Circuito radiador abierto	Offener Strahlungskreis
Circuit, oscillatory	Circuit oscillatoire	Circuito oscillante	Circuito oscilante	Schwingungskreis
Coherer	Coherer	Ricevitore a coherer	Cohesor	Fritterempfang
Coil, syntonising	Inductance de syntonisation	Rocchetto di sintonizzazione	Bobina de sintonización	Abstimmsspule
Commutator	Commutateur	Commutatore	Conmutador	Stromwender
Commutator (of Dynamo)	Collecteur	Collettore	Colector	Stromwender
Condensers	Condensateurs	Condensatori.	Condensadores	Kondensatoren
Condenser, adjustable	Condensateur réglable	Condensatore regolabile.	Condensador variable	Variabler Kondensator
Condenser, adjustable disc	Condensateur à disque	Condensatore a disco regolabile	Condensador de disco, variable	Drehkondensator
Condenser, aerial tuning	Condensateur de syntonisation d'antenne	Condensatore per la sintonizzazione dell' antenna	Condensador de sintonización de la antena	Kondensator zur Luftleiterabstimmung
Condenser, air	Condensateur à air	Condensatore ad aria	Condensador de diatétrico de aire	Luftkondensator
Condenser, calibration	Condensateur étalon	Condensatore per taratura	Condensador para calibración	Eichungskondensator
Condenser, circuit	Circuit du condensateur.	Circuito del condensatore	Condensador, Circuito de	Kondensatorkreis
Condenser, intermediate circuit	Condensateur du circuit intermédiaire	Condensatore per il circuito intermedio	Condensador del circuito intermedio	Kondensator im Zwischenkreis

Dictionary of Technical Terms—Continued

ENGLISH.	FRENCH.	ITALIAN.	SPANISH.	GERMAN.
Condenser, secondary circuit	Condensateur du circuit secondaire	Condensatore per il circuito secondario	Condensador del circuito secundario	Kondensator im Sekundärkreis
Condenser, short wave	Condensateur de raccourcissement	Condensatore per onda corta	Condensador de onda corta	Verkürzungskondensator
Condenser-system	Système de condensateur	Sistema di condensatori	Sistema de Condensadores	Kondensatorsystem
Condensers, test-tube	Condensateurs à tube	Condensatori tubolari	Tubo para ensayo de condensadores	Kondensator Prüfröhre
Condenser, twin-coupled	Condensateur jumelé	Condensatore a doppio accoppiamento	Condensador de doble acoplamiento	Kondensator, doppelt geschaltete
Condensers, variable	Condensateurs réglables	Condensatori variabili	Condensadores variables	Variablerkondensatoren
Converter	Commutatrice	Convertitore	Convertidor	Drehumformer
Continuous wave	Onde entretenue	Onda continua	Onda continua	Kontinuierliche Welle
Continuous wave receiver	Recepteur pour ondes entretenues	Ricevitore d'onde non smorzate	Receptor para onda continua	Empfänger fuer kontinuierliche Welle
Coupling	Couplage	Accoppiamento	Acoplamiento	Kopplung
Couplings, flexible and insulating	Maillons d'accouplement souples et isolants	Accoppiamenti elastici ed isolanti	Acoplamientos flexibles y al-ladores	Biegsame und isolierende Verbindungen
Current, alternating	Courant alternatif	Corrente alternata	Corriente alterna	Wechselstrom
Current, direct	Courant continu	Corrente continua	Corriente continua	Gleichstrom
Current, primary alternating	Courant alternatif primaire	Corrente alternata del circuito primario	Corriente alterna primaria	Primär Wechselstrom
Cut-out, automatic	Interrupteur automatique	Interruttore automatico	Interruptor automático	Selbstunterbrecher
Cymometers	Cymomètres	Cinometri	Cinómetro	Wellenmesser
Damper	Sourdine	Sordina	Amortiguador	Dämpfer
Damping, high	Amortissement élevé	Forté smorzamento	Amortiguamiento, Gran	Grosse Dämpfung
Decremeter	Décrémètre	Decrimetro	Decrémetro	Dekremeter (Dampfungsmesser)
Detector, crystal	Détecteur à cristal	Rivelatore di onde a cristallo	Detector de cristal	Krystalldetektor
Detector, balanced crystal	Détecteur à cristal équilibré	Rivelatore a cristalli compensati	Detector de cristal compensador	Wellenanzeiger, balancierten Kristall
Detector, Fleming valve	Récepteur à valve d'oscillation "Fleming"	Rivelatore di onde con valvola di Fleming	Detector de Válvula, Fleming	Prof. Fleming's Valve-Empfänger
Detector, magnetic	Détecteur magnétique	Rivelatore di onde magnetico	Detector magnético	Marconi-Magnetdetektor
Detector, thermo-electric	Détecteur thermo-électrique	Rivelatore di onde termoelettrico	Detector termoelectrico	Thermoelektrischer-

Discharger, asynchronous	Eclateur asynchrone	Scaricatore asincrono	Descargador asincrono	Dischargefunkenstrecke, Scheibenfunkenstrecke, asynchron
Discharger, disc, high-speed	Eclateur à disque à grande-vitesse	Scaricatore a disco ad alta velocità	Descargador de disco de gran velocidad	Schnell rotierende Scheibenfunkenstrecke
Discharger, disc, smooth	Eclateur à disque uni	Scaricatore a disco a contorni lisci	Descargador de disco liso	Rotierende Scheibenfunkenstrecke-glatt
Discharger, disc, studded	Eclateur à disque—muni de prisonniers latéraux	Scaricatore a disco con punte	Descargador de disco dentado	Rotierende Scheibenfunkenstrecke mit Zähne
Discharger, fixed	Eclateur fixe	Scaricatore fisso	Descargado fijo	Scheibenfunkenstrecke, fixierter
Discharger, micrometric spark	Eclateur à étincelle micrométrique	Scaricatore per la produzione di scintilla micrometrica	Descargador de chispa micrométrica	Mikrometerfunkenstrecke
Discharger, side electrodes	Eclateur à électrodes latérales	Scaricatore con elettrodi laterali	Descargador, electrodos laterales del	Scheibenfunkenstrecke, Seiten electroden
Discharger, synchronous	Eclateur synchrone	Scaricatore sincrono	Descargador sincrónico	Scheibenfunkenstrecke, synchron
Duplex telegraphy	Télégraphe duplex	Telegrafia duplex	Telegrafia duplex	Duplex Telegraphie
Earth connection	Connexion de terre	Messa a terra	Conexión de tierra	Erd Verbindung
Efficiency	Rendement	Rendimento	Rendimiento	Wirkungsgrad
Frequency, high	Haute fréquence	Alta frecuencia	Frecuencia, alta	Hochfrequenz
Frequency, low	Basse fréquence	Bassa frecuencia	Frecuencia, baja	Niedfrequenz
Frequency meter	Fréquence-mètre	Frequenziometro	Frecuencímetro	Frequenzmesser
Generating plant	Générateur	Impianto generatore	Instalación generadora	Stromanlage
Generator, c.c.	Dynamo	Generatore di corrente continua	Generador de corriente continua	Dynamo (Gleichstrom)
Hammer-break, magnetic	Interrupteur à marteau	Interruttore magnetico a martello	Interruptor magnético de martillo	Magnetischer Hammerunterbrecher
Inductance, aerial	Inductance d'antenne	Induttanza dell' antenna	Inductancia de antena	Antenneninduktanz
Inductance, aerial tuning	Inductance à syntoniser le circuit de l'antenne	Induttanza per la sintonizzazione dell' antenna	Inductancia de sintonización de la antena	Induktanz zum Syntonisieren der Antenne
Inductance, low frequency	Bobine d'inductance du circuit à basse fréquence	Induttanza per il circuito a bassa frequenza	Inductancia del circuito de baja frecuencia	Induktanzspule niedriger Frequenz
Inductance, primary	Inductance primaire	Induttanza per circuito primario	Inductancia primaria	Primärinduktanz

Dictionary of Technical Terms—Continued

ENGLISH.	FRENCH.	ITALIAN.	SPANISH.	GERMAN.
Inductance, primary syntonsing	Inductance primaire de syntonisation	Induttanza sintonzatrice del circuito primario	Inductancia primaria de sintonización	Primärinduktanz zum Abstimmen
Inductance, variable primary syntonsing	Inductance primaire variable de syntonisation	Induttanza sintonzatrice del circuito primario, regolabile	Inductancia variable de sintonización del primario	Veränderliche Primärinduktanz zum Abstimmen
Induction coil.	Bobine d'Induction	Rocchetto d'induzione	Bobina de inducción	Rhumkorffscher Funkeninduktor
Inkwriter, Morse	Appareil Morse enregistreur	Ricevitore scrivente Morse	Aparto Morse registrador	Schreibempfänger
Insulation	Isolation	Isolamento	Aislamiento	Isolierung
Insulator, leading-in	Isolateur d'entrée	Isolatore d'entrata	Aislador de entrada	Isolator, Einführungs
Insulator, flexible	Isolateur souple	Isolatore elastico	Aislador flexible	Flexibler Isolator
Insulator, receiving	Isolateur de réception	Isolatore dell' antenna di ricezione	Aislador para circuito receptor	Isolator für den Empfangsdraht
Insulator, transmitting	Isolateur de transmission	Isolatore dell' antenna di trasmissione	Aislador para circuito transmisor	Isolator für die Sendantenne
Interrupter	Rupteur	Interruttore	Interrupor	Unterbrecher
Interrupter, current	Rupteur de courant	Interruttore di corrente	Interrupor de corriente	Stromunterbrecher
Interrupter, electrolytic	Rupteur électrolytique	Interruttore elettrolitico	Interrupor electrolítico	Wehnelt Unterbrecher
Interrupter, turbine	Turbo-rupteur à mercure	Interruttore a turbina	Interrupor de turbina	Quecksilberturbinenunterbrecher
Jigger	Transformateur d'oscillations	Trasformatore delle correnti oscillatorie	"Jigger"	Jigger, Selbst-induktion des Erregerkreises
Jigger, balanced	Jigger compensé	Trasformatore ad alta frequenza compensato	Jigger compensador	Jigger, bilanzierter
Jigger, primary	Primaire de transformateur d'oscillation	Circuito primario del trasformatore delle correnti oscillatorie	"Jigger," primario del	Primär-Jigger
Jigger, secondary	Secondaire de transformateur d'oscillation	Circuito secundario del trasformatore delle correnti oscillatorie	"Jigger," secundario del	Sekundär-Jigger
Key-sending	Manipulateur	Tasto manipolatore di trasmissione	Manipulador	Taste
Lamp, tuning—and choke	Lampe de Syntonisation avec bobine de réactance	Lampada di sintonizzazione con bobina	Lámpara de sintonización y de reactancia	Syntonisierlampe mit Impedanz

Leyden jar Leyden jar, battery of Lightning arrester. (<i>See</i> Arrester, lightning)	Bouteille de Leyde. Batterie de bouteilles de Leyde	Bottiglia di Leyda. Batteria di bottiglie di Leyda	Botella de Leyden. Bottellas de Leyden, Bateria de	Leydener Flasche Batterie Leydener chen
Mast, portable Masts, steel sectional	Mât, portatif. Mâts d'acier à sections	Albero, portatile Albero di acciaio diviso in sezioni	Mástil, portátil Mástil de secciones de acero	Tragbarer Mast Stahlmasten in Teilen
Mast, telescopic Microphone apparatus Micrometer, spark Motor alternator disc set	Mât, télescopique Appareil microphone Micromètre à étincelle Groupe moteur alterna- teur avec éclateur à disque	Albero telescopico Apparecchio microfonico. Micrometro per Scintilla. Gruppo convertitore con scaricatore a disco	Mástil telescópico Aparato microfónico Micrometro de chispa Grupo de motor, alter- nador con estallador de disco	Teleskopmast Microphon-Apparat Funkenmikrometer Wechselstromgenerator kombiniert mit Rotier- ende Funkenstrecke
Multiple transmission and reception	Transmission et réception multiples	Trasmisioinee Ricezione multipla	Transmisión y recepción multiple	Vielfach Übermittlung und Empfang
Oscillations, electric Overload	Oscillations électriques Surcharge	Oscillazioni elettriche Sovraccarica.	Oscilaciones eléctricas Sobrecarga.	Elektrische-Schwingungen Überlast
Plant, radiotelegraphic Potentiometer	Installation radiotélé- graphique Potentiometre	Impianto radiotelegrafico Potenziometro	Instalación radiotelegrá- fica Potenciómetro	Radiotelegraphische An- lage Potentiometer
Radiogoniometer Range Receiver Receiver arrangement Receiver, balanced Receiver, flexible Receiver, vacuum valve	Radiogoniomètre Portée Appareil récepteur Dispositif de réception Récepteur compensé Récepteur souple Récepteur à valve d'oscil- lation	Radiogoniometro Portata Apparecchio ricevitore Dispositivo di ricezione Rivelatore compensato Ricevitore fles Ricevitore con valvola a vuoto	Radiogonometro Alcance Receptor Dispositivo de recepcion. Receptor compensador Receptor flexible Receptor de válvula de vacio	Radiogoinometer Reichweite Empfänger Empfangsvorrichtung Empfänger, balanzierter Empfänger Vakuum ventil Empfänger
Rectifiers Relay Relay H.T.	Rectificateurs Relais Relais pour haute tension	Raddrizzatori di corrente Soccorritore Soccorritore ad alta ten- sione	Rectificador Relevador Relevador A.T.	Ausgleicher Relais Hochspannungsrelais
Relay magnets Resistance, high Resistance, low Resistance, starting Resistance regulating	Aimants du relais Haute résistance Basse résistance Rhéostat de démarrage Rhéostat de champ	Magnet di soccorritore Alta resistenza Bassa resistenza Reostato di avviamento Reostato di campo	Imanes del relevador Resistencia, alta Resistencia, baja Reostato de arranque Resistencia de regulación	Relais-magnete Hoher Widerstand Niedriger Widerstand Anlasser Regulierwiderstand

Dictionary of Technical Terms—Continued

ENGLISH.	FRENCH.	ITALIAN.	SPANISH.	GERMAN.
Room, accumulator (battery)	Salle des accumulateurs .	Stanza per la batteria di accumulatori	Sala de acumuladores (Bateria)	Akkumulatorenraum
Room, operating . . .	Salle de manipulation et réception	Ufficio radiotelegrafico .	Sala telegráfica . . .	Bedienungsraum für die Drahtloseinstellung
Room, transmitting .	Chambre des appareils de transmission	Locale di trasmissione .	Sala de manipulación .	Senderraum
Saddles, pack . . .	Selles de paquetage .	Bastì	Bastes	Packsattel
Screening box . . .	Boîte de garde . . .	Cassette di protezione .	Caja de resguardo . .	Schutzkasten
Series rheostat . . .	Rhéostat en série . .	Reostato in serie . . .	Reostato en serie . . .	Serien Widerstand
Ship station	Station de bord . . .	Stazione navale	Estación de á bordo . .	Schiffstation
Short circuiting device	Dispositif de mise en court circuit	Dispositivo di messa in corto circuito	Dispositivo de corto circuito	Kurzschliesser
Shunt, highly inductive .	Shunt à pouvoir inductif élevé	Shunt ad alta induzione.	Shunt altamente inductivo	Shunt mit hoher Selbstinduktion
Shunt, non-inductive .	Shunt, non-inductif .	Circuito in derivazione non-induttivo	Shunt, no inductivo .	Nebenschluss
Signals, balancing	—	Segnali equilibrati . .	Señales compensadores .	Balanciersignale
Signals, telephone .	Signaux téléphoniques .	Segnali del telefono . .	Señales telefónicas . .	Telephonsignale
Span	Haubanage	Campata	Tirante	Abspannung
Spark	Étincelle	Scintilla	Chispa	Funk
Spark coil, with hammer-break	Bobine d'induction à interrupteur à marteau	Rocchetto d'induzione a martello	Bobina de chispa con interruptor de martillo .	Funkensinduktor mit Hammerunterbrecher
Spark gap	Eclateur à étincelle .	Oscillatore	Espacio de chispa . . .	Funkensstrecke
Spark gap, micrometric .	Eclateur à intervalle micrométrique	Oscillatore micrométrico.	Espacio micrométrico .	Micrometer Funkensstrecke
Spark micrometer . .	Micromètre à étincelles .	Micrometro di scintilla .	Micrómetro de chispa .	Funkennikrometer
Spark gap, multiple .	Eclateur en série . .	Oscillatore multiplo . .	Espacio de chispa multiple	Unterteilte Funkensstrecke
Spark gap, quenched .	Eclateur pour étincelle étouffée	Spinterometro per oscillazioni smorzate	Descargador de chispa extinguida	Gedaempfte Funkensstrecke
Spark quenched . . .	Étincelle étouffée . .	Scintilla smorzata . .	Chispa extinguida . .	Löschfunke
Sparkling distance . .	Distance explosive . .	Distanza esplosiva . .	Distancia explosiva . .	Funkensstrecke
Starter, automatic . .	Démarrer, automatique	Avviateur automatico .	Reostato de arranque automático	Selbstanlasser
Starter, combined with shunt regulator	Rhéostat de démarrage avec rhéostat de champ	Reostato di avviamento combinato con regolatore in derivazione	Reostato de arranque y regulador de campo combinados	Anlasswiderstand mit Nebenschlussregler

Starter, single-phase	Démarrur monophasé	Aviatore per corrente monofase	Reostato de arranque monofásico	Einphasenanlasser
Starter, three-phase	Démarrur tri-phasé	Aviatore per corrente trifase	Reostato de arranque trifásico	Dreiphasenanlasser
Station, aeroplane	Aéroplane (poste d')	Stazione per aeroplano	Estación para aeroplano	Flugzeug Station
Station, airship	Station de ballon dirigeable	Stazione per aeroneve	Estación para globos dirigibles	Luftschiffstation
Station, cart type	Station du type sur voiture	Stazione del tipo su carri	Estación tipo de carros	Karren station, Fahrbarstation
Station, cavalry	Poste de cavalerie	Stazione per cavalleria	Estación de cavaleria	Kavalleriestation
Station, high-power	Station à grande puissance	Stazione di grande potenza	Estación de gran potencia	Kraftstation
Station, knapsack	Poste de havresac	Stazione da zaino	Estación de mochilas	Tornierstation
Station, landing	Poste de débarquement	Stazione da sbarco	Estación de desembarco	Landungsstation
Station, long-distance	Poste de grandes distances	Stazione ultrapotente	Estación de gran alcance	Radiotelegraphische Grossstation
Station, portable	Station portative	Stazione portatile	Estación portátil	Tragbarestation
Station, portable military	Poste militaire transportable	Stazione militare mobile	Estación militar portátil	Tragbare Militärstation
Station, radiotelegraph	Poste radiotélégraphique	Stazione radiotelegrafica	Estación radiotelegráfica	Funkensamt
Station, small-power	Station à faible puissance	Stazione di piccola potenza	Estación de pequeña potencia	Kleinstation
Swiss commutator	Commutateur suisse	Commutatore tipo svizzero	Commutador suizo	Schweizerische Kommutator
Switch, aerial change-over	Commutateur d'antenne	Commutatore dell'antenna	Commutador para cambio de hilos de antena	Luftdrahtumschalter
Switch, aerial heating	Commutateur, échauffement d'antenne	Interruttore per riscaldamento dell'antenna	Commutador de seguridad contra calentamiento de la antena	Umschalter zum heizen der Antenne
Switch, automatic	Interruteur automatique	Interruttore automatico	Interruptor automático	Selbsttactiger Schalter
Switch, automatic field break	Interruteur automatique d'excitation	Interruttore automatico di eccitazione	Interruptor automatico del campo	Selbsttactiger Magnet-ausschalter
Switch, carbon break	Interruteur à contacts de charbon	Interruttore a carbone	Interruptor con contactos de carbón	Kohlenschalter
Switch, change-over	Commutateur	Commutatore	Commutador	Umschalter
Switch, change-tune	Commutateur de longueurs d'ondes	Commutatore di sintonizzazione	Commutador de sintonización	Wellenumschalter
Switch, charging	Interruteur de charge	Interruttore di carica	Commutador de carga	Ladeschalter
Switch, combined fuse and circuit	Interruteur avec coupe circuit	Fusibile ed interruttore combinati	Interruptor con fusible	Schalter und Sicherungskombiniert
Switch, double-bladed knife	Interruteur bipolaire à lames	Interruttore doppio a coltello	Interruptor de cuchillo, bipolares	Doppelmesserschalter
Switch, double-pole	Interruteur bipolaire	Interruttore bipolare	Interruptor bipolar	Zweipoliger Schalter
Switch, double pole, double throw	Commutateur bipolaire à deux directions	Interruttore bipolare a doppio effetto	Commutador bipolar de dos posiciones	Zweipoliger Umschalter
Switchboard, d.c. and a.c.	Tableau de distribution pour courant continu et alternatif	Quadro di distribuzione per corrente continua ed alternata	Cuadro de distribución de c.a. y c.c.	Schalttafel fuer Gleich und Wechselstrom

Dictionary of Technical Terms—Continued

ENGLISH.	FRENCH.	ITALIAN.	SPANISH.	GERMAN.
Switch, field-break .	Interrupteur de l'excitation	Interruttore ad ecitazione	Interruptor del campo	Magnetausschalter
Switch, high-tension .	Interrupteur pour haute tension	Interruttore per alta tensione	Interruptor de alta tensión	Hochspannungsschalter
Switch, high-tension remote control	Téléinterrupteur pour haute tension	Interruttore ad alta tensione comandato a distanza	Téléinterruptor de alta tensión	Hochspannungsfern-schalter
Switch, knife .	Interrupteur unipolaire a lames	Interruttore a coltello	Interruptor de cuchillo	Messerschalter
Switch, main .	Interrupteur principal	Interruttore principale	Interruptor principal	Hauptschalter
Switch, oil-break .	Interrupteur à bain d'huile	Interruttore ad olio	Interruptor con baño de aceite	Oelschalter
Switch, press (toggle)	Interrupteur à pression	Interruttore a pressione	Interruptor de tornillo	Druckschalter
Switch, quick-break	Interrupteur à rupture brusque	Interruttore a scatto rapido	Interruptor de rotura brusca	Momentschalter
Switch, single-pole	Interrupteur unipolaire	Interruttore unipolare	Interruptor monopolar	Einpoligerschalter
Switch, three-phase	Interrupteur pour courant tri-phasé	Interruttore tripolare	Interruptor trifásico	Drehstromschalter
Switch, three-way	Commutateur à trois directions	Commutatore a tre vie	Commutador de tres pasos	3 Wege Umschalter
Switch, voltmeter	Interrupteur du voltamètre	Interruttore per voltmetro	Interruptor para voltmetro	Voltmeterumschalter
Switch, wave-changing	Commutateur pour changement de longueur d'onde	Commutatore d'onda	Commutador de cambio de onda	Wellen Umschalter
Synchronised	Synchronisation	Sintonizzazione	Sintonización	Abstimmung
Synchronised wireless telegraphy	Télégraphie sans fil synchronisée	Radiotelegrafia sintonica.	Telegrafía sin hilos sintonizada	Abstimmbare Drahtlose-telegraphie
Table, operating .	Table de manipulation	Tavola per il servizio radio-telegrafico	Mesa de aparatos	Radiotelegrafischer Bedienungstisch (Apparatstisch)
Tapper .	Frappeur	Decoherer	Decoheror de martillo	Klopfer
Telegraphy, directional wireless	Radiotélégraphie dirigée.	Radiotelegrafia a sistema dirigitile	Telegrafía sin hilos dirigida	Gerichtete Drahtlose Telegraphie
Transformer .	Transformateur	Transformatore	Transformador	Transformator
Transformer, high-frequency oscillation	Transformateur d'oscillation à haute fréquence	Trasformatore delle correnti oscillatorie ad alta frequenza	Transformador de oscilaciones de alta frecuencia	Umformer fuer Hochfrequenzschwingungen
Transformer, oscillatory .	Transformateur d'oscillation	Trasformatore delle correnti oscillatorie	Transformador oscilatorio	Oscillationsumformer

Transmitting arrangement	Dispositif d'émission	Dispositivo di trasmissione	Dispositivo de transmisión	Sender anordnung
Transmitter cavalry	Transmetteur pour cavalerie	Trasmittitore di stazione per cavalleria	Transmisor para estación de cavaleria	Kavalleriesendeapparat
Transmitter, inductive	Transmetteur à couplage inductif	Trasmittitore ad accoppiamento induttivo	Transmisor de acoplamiento de inducción	Gekoppelte Sender
Transmitter, sharply-tuned	Transmetteur à syntonisation aiguë	Trasmittitore acutamente sintonizzato	Transmisor de sintonización aguda	Scharf abgestimmte Sender
Transmitter, simple (P.A.)	Dispositif d'émission directe	Trasmittitore semplice	Transmisor sencillo	Einfacher Sender
Tremblers	Trembleurs	Interruttore a martello	Tembladores	—
Trench, covered in for wiring	Canalisation souterraine	Fossa coperta per cavi elettrici	Temblador de canecillo	—
Tube, ebonite	Tube en ébonite	Tubo di ebanite	Zanja cubierta para cables	Abgedeckter Kabelgraben
Tuning	Syntonisation	Sintonizzazione	Tubo de ebonita	Ebonitroehre
Tuning, flat	Syntonisation non aiguë	Sintonizzazione piana	Sintonización	Abstimmen
Tuner, multiple	Syntonisateur multiple	Sintonizzatore multiplo	Sintonización aplastada	Unscharfes Abstimmen
Tuning, note	Hauteur de la note	Sintonizzazione della nota	Sintonización múltiple	Vielfach Abstimmapparat
Tuning, note and wave	Note et onde de syntonisation	Sintonizzazione della nota e dell'onda	Sintonización de la nota y de la onda	Tonhöhe der Abstimmung
Tuning wave	Onde de syntonisation	Sintonizzazione della onda	Sintonización de la onda	Welle der Abstimmung
Undamped wave. (See Continuous wave)				
Valve	Valve	Valvola	Válvula	Ventil
Valve, vacuum	Valve à vide	Valvola a vuoto	Válvula de vacío	Vakuumventil
Voltage	Voltage	Potenziale	Voltaje	Spannung
Voltmeter, a.c.	Voltmètre pour courant alternatif	Voltmetro per corrente alternata	Voltmetro c.a.	Voltmeter für Wechselstrom
Voltmeter, aperiodic	Voltmètre aperiodique	Voltometro aperiodico	Voltmetro aperiódico	Aperiodisches Voltmeter
Voltmeter, d.c.	Voltmètre pour courant continu	Voltmetro per corrente continua	Voltmetro c.c.	Voltmeter fuer Gleichstrom
Voltmeter, hotwire	Voltmètre à fil chaud	Voltmetro a filo caldo	Voltmetro térmico	Heizdrahtvoltmeter
Voltmeter, switch	Interrupteur de volt-mètre	Interruttore per voltmetro	Voltmetro, interruptor para	Voltmeterumschalter
Wagon apparatus	Voiture portant les appareils	Carro per gli apparecchi	Aparatos sobre carros	Apparatekarren
Wagon, dynamo	Voiture portant le générateur	Carro per il generatore	Dinamo sobre carros	Kraftkarren-Kraftwagen
Wavelength	Longueur d'onde	Lunghhezza d'onda	Longitud de onda	Wellenlaenge
Wavemeter	Ondemètre	Ondametro	Ondámetro	Wellenmesser
Waves, radiation of	Radiation des ondes	Irraggiamento di onde	Radiación de las ondas	Austrahlung der Wellen

USEFUL FORMULAE AND EQUATIONS

Compiled under the supervision of Dr. ERSKINE MURRAY, D.Sc., F.R.S.E., M.I.E.E.
(The names of the Authors are given in square brackets).

SUBJECT	FORMULA	NOTES
1. Practical Electromagnetic Units and Symbols in general use.		
Current, I	Ampère	The numbers give the values of the Practical Units in C.G.S. Electromagnetic Units. See also pp. 1040-3, "Synopsis of Units," etc.
Electromotive Force	$\left. \begin{array}{l} E \text{ or } V \text{ Volt} \\ \text{Pressure} \\ \text{Difference of Potential} \end{array} \right\}$	. . . . . 10^{-1}
Voltage		
Pressure		
Quantity of Electricity Q	Coulomb	Small letters are used when the quantities are variable. $KE=Q$
Capacity, K or C	Farad . . . . .	. . . . . 10^{-9} 10^{-15}
	microfarad	
Inductance, L	Henry . . . . .	. . . . . 10^9
	microhenry. . . . .	. . . . . 10^3
Resistance, R	Ohm . . . . .	. . . . . 10^9
Work or Energy, W	Joule . . . . .	. . . . . 10^7
	Foot pound . . . . .	. . . . . $1 \cdot 356 \times 10^7$
	Kilogrammeter . . . . .	. . . . . $9 \cdot 8 \times 10^7$
	Kilowatt-hour . . . . .	. . . . . $3,600 \times 10^{10}$
Power or Activity, P	Watt . . . . .	. . . . . 10^7
	Kilowatt . . . . .	. . . . . 10^{10}
	Horse Power . . . . .	. . . . . 746×10^7
or 33,000 ft. lbs. per min. or 550 ft. lbs. per sec.		[Watt]
2. Work, Energy and Power		

3. Relation between Work and Heat.

The Heat required to raise the temperature of one pound of water 1° F. is called Joules Equivalent $J = 776$ ft. lbs. If the heat unit be one gram degree centigrade, Joules Equivalent $J = 4.2 \times 10^7$. [Joule]
Heat produced by current in wire = Amps \times Volts/4.2. [Joule]

Ergs.
Gram-degrees Centigrade per second.

4. Frequency, Wave-length, and Velocity of Waves.

The velocity of Light and of Free Electromagnetic Waves

$$v = 186,000 \text{ miles per second} \\ = 3 \times 10^8 \text{ metres per second}$$

[Fizeau]
[Maxwell]

λ = Wave-length, from crest to crest or positive to next positive.

n = Frequency = cycles per second.

T = Duration of one complete Cycle = Period.

$$T = 1/n; \lambda = v/n.$$

Symbol \sim also used for frequency.

E.g. The period of a wave of frequency 500,000 is $1/500,000$ sec., and since $600 = 3 \times 10^8 / 5 \times 10^5$ a 600 metre wave has a frequency of 500,000.

C.G.S. or Absolute Units.

(See Synopsis of Units, etc., pp. 1040-3).

5. Capacities

Capacity, condenser.

(a) Sphere of radius r cms., in open space
 $= 4/9 \times 10^5$ microfarads

(b) Parallel Plate Condenser,
 A = Total area of working sides of plates connected to one terminal, in sq. cms.

d = Distance between + and — plates in cms.

k = Specific Inductive Capacity of Dielectric

$$K = \frac{Ak}{11.31 \times 10^6 \times d} \dots \text{mfd.}$$

See table of Sp. Ind. Caps on p. 1047.
The Sp. Ind. Cap. of Air = 1.

SUBJECT	FORMULA	NOTES
5. Capacity— <i>cont.</i> Capacity, Concentric Cylinders	<p>(c) Concentric Cylinders, r_1 = Outer radius of Inner Conductor r_2 = Inner of outer Conductor l = Length in cms. k = Specific Inductive Capacity of Dielectric</p> $K = l / \left(4 \cdot 143 \times 10^9 \times \log \frac{r_2}{r_1} \right) \dots \text{ mfd.}$	<p>Capacities in parallel $\frac{1}{K} = \frac{1}{K_1} + \frac{1}{K_2} + \dots$ &c.</p>
Capacity, Horizontal Aerial.	<p>(d) Horizontal Wire above Earth, l = Length in cms. d = Diameter in cms. h = Height above Earth in cms.</p> $K = l / \left(4 \cdot 143 \times 10^9 \times \log \frac{2h}{d} \right) \dots \text{ mfd.}$	<p>$\log \frac{r_2}{r_1}$; this log is the ordinary log to base 10.</p>
Capacity, Measurement of.	<p>To Measure Capacity. (1) Put it in series with known Inductance and measure wave-length given out by the current when oscillating, or, (2) Put it in series with oscillating circuit having known capacity and measure change of wave-length (see 19 below).</p> <p>In (1) $K_1 = \lambda^2 / 3,600L$; in (2) $K_1 = K_2 \frac{\lambda_1^2 - \lambda_2^2}{\lambda_1^2}$</p>	<p>$\log \frac{2h}{d}$; this log is the ordinary log to base 10.</p>
6. Capacity of Antenna	<p>K_1 = Capacity of the Antenna λ_1 = Wave-length of the Antenna λ_2 = Wave-length of the Antenna when an extra condenser of known capacity = K_2 is inserted in series. Then (see p. 1027 below)</p>	<p>λ_1, in metres. K_1, in microfarads. L, in cms., C.G.S.</p>

Note.—This method is only approximate. It gives best results when K_2 is large as compared with K_1 .

$$\lambda_1 = 2\pi \sqrt{K_1 L}$$

$$\lambda_2 = 2\pi \sqrt{\frac{K_1 K_2}{K_1 + K_2} L}$$

$$K_1 = K_2 \frac{\lambda_1^2 - \lambda_2^2}{\lambda_1^2}$$

and

hence

Straight Wire,

l = Length in cms.

r = Radius in cms.

L = Inductance in cms. (C.G.S. Units)

$$L = 2l(2 \cdot 3026 \times \log \left(\frac{2l}{r} \right) - 1)$$

[Neumann]

Square made of round wire :

l = whole length of wire in square in cms.

$$L = 2l(2 \cdot 3026 \times \log \left(\frac{l}{r} \right) - 1 \cdot 91)$$

[Kirchhoff]

Circle made of round wire ;

a = Radius of Circle

r = Radius of section of wire

$$L = 12 \cdot 57a \left[\left(1 + \frac{r^2}{4a^2} \right) 2 \cdot 3026 \times \log \left(\frac{8a}{r} \right) - 2 \right]$$

[Rosa]

or approximately

$$L = 12 \cdot 57a(2 \cdot 3026 \times \log \left(\frac{8a}{r} \right) - 2)$$

[Kirchhoff]

7. Inductance, Self . . .

Inductance, Straight Wire.

Inductance, Square.

Inductance, Circle.

Units K_1 and K_2 must be in same though any unit, likewise λ_1 and λ_2 .

Divide by 10^3 to get micro-henrys.
Use ordinary logs.

C.G.S. units.

„

SUBJECT	FORMULA	NOTES
Inductance, Solenoid.	<p>Solenoid, Long—i.e., in which the length is great as compared with the diameter.</p> <p>a = mean radius in cms. N_1 = number of turns per cm. b = length in cms. $L = 4\pi^2 a^2 N^2 b.$</p> <p>Solenoid, Short.</p> <p>a = radius (measured to centre of wire). b = overall length, including insulation. N = total number of turns.</p> $L = 4\pi a N^2 \left[2.3026 \times \log\left(\frac{8a}{b}\right) - \frac{1}{2} + \frac{b^2}{32a^2} \left(2.3026 \times \log\left(\frac{8a}{b}\right) + \frac{1}{4} \right) \right]$ <p>[Rayleigh and Niven]</p> <p>Another formula, approximate for any ratio of length to diameter.</p> <p>a = radius in cms. N = number of turns per cm. l = length.</p> $L = 4\pi^2 \frac{a^2 N^2}{l} \left(1 - \frac{8a}{3\pi l} + \frac{a^2}{2l^2} - \frac{a^4}{4l^4} + \frac{5a^6}{16l^6} \pm \text{etc.} \right)$ <p>[Webster and Russell]</p>	<p>C.G.S. units. $\pi = 3.1416$. $4\pi^2 = 39.49$.</p> <p>C.G.S. units. $4\pi = 12.5664$.</p> <p>The inductance of two coils in parallel but having no mutual inductance, i.e., either distant from one another or at right angles to one another.</p> $L = \frac{L_1 L_2}{L_1 + L_2}$
8. Inductance, Measurement of.		

9. Inductance of Antenna, Measurement of.

In (1) $L = \lambda^2/3600 K$; in (2) $L = L_1 \frac{\lambda_1^2 - \lambda_2^2}{\lambda_1^2}$.
 L cms., C.G.S. K in microfarads and in λ metres.

The inductance of an antenna may be measured by a method similar to that given for capacity in 6.

10. Inductance, Mutual, Measurement of.

To measure the Mutual Inductance of two coils having self inductances L_a and L_b placed in a given position relative to one another.

Connect the coils in series and measure the total self induction L_1 of the system.

Reverse the connections on one coil only, thus reversing the current in it, measure L_2 , then

$$L_1 = L_a + L_b + M$$

$$L_2 = L_a + L_b - M$$

$$\text{Hence } M = (L_1 - L_2)/2$$

11. Resistance at High Frequencies.

Straight Copper Wire of radius $= r$ cms.

R_o = Resistance to Direct Current (see Tables, pp. 1040-3).
 R_n = Resistance at Frequency n .

$$R_n = R_o \left(1 + \frac{1 \cdot 121}{10^5} n^2 r^4 - \frac{1 \cdot 007}{10^{10}} n^4 r^8 \right)$$

[From Rayleigh's formula]

Another formula—

$$R'_n = R_o \sqrt{0 \cdot 0058 n}$$

[From Rayleigh's formula]

12. Electrical Energy . .

Energy in Charged Condenser.

$$W = \frac{1}{2} QE \\ = \frac{1}{2} KE^2$$

[Kelvin]

Note the resistance of managan wire of about 0.8 mm. diameter is practically the same for D.C. as for wireless frequencies

When frequency very high.

SUBJECT	FORMULA	NOTES
Electrical Energy—cont.		
	<p>If K in microfarads and E in volts,</p> $W = \frac{1}{2 \cdot 10^6} KE^2 \dots \text{Joules (Watt-seconds)}$ $= \frac{1}{72 \times 10^4} KE^2 \dots \text{kilowatt-hours.}$	
	<p><i>Energy in Inductance Carrying Current.</i> If L in henrys and I in ampères, $W = \frac{1}{2} LI^2 \dots \text{Joules}$ $W = \frac{1}{72 \times 10^4} LI^2 \dots \text{kilowatt-hours.}$</p>	
13. Alternators	<p>Frequency (per second) = (revs. per min. \times Number of Poles) / 120. In the Goldschmidt H.F. Alternator the frequency is raised by addition of resonating circuits to stator and rotor—e.g., if frequency as ordinary alternator be 10,000; frequencies of 20,000, or 30,000, or 40,000, etc., can be obtained in aerial circuit according to the intermediate circuits used.</p>	
14. Sine Curves	<p>The curve representing the equation $y = A \sin x$ is a simple sine curve, where A is the maximum value of y, or Amplitude. Usually the curve of an Alternator is not simple but represents $y = A_1 \sin x + A_2 \sin 2x + A_3 \sin 3x + \dots$ these terms represent harmonics, where A_1, A_2, etc., are their amplitudes.</p>	

The equation

$$y = \sin 2\pi nt$$

represents a simple periodic motion of frequency n .

15. Simple Harmonic Motion.

High frequency Alternating and Interrupted Currents are usually measured by means of hot-wire ammeters. The quantity measured is not the actual current at any instant but the effective value of the current over a number of cycles or wave trains.

R.M.S. Amperes.

The value indicated by a hot-wire instrument is the root of the mean square of the current = R.M.S. amperes.

For sine waves the R.M.S. amps. = $\frac{I}{\sqrt{2}}$ (maximum instantaneous current) = $0.707 (I_m)$.

16. Hot Wire Ammeters

In an alternating current circuit the ratio volts/amperes is a constant and is called the Impedance.

Impedance = Volts/Ampères

In a circuit having Inductance, Capacity and Resistance in Series, where $p = 2\pi n = 6.28n$,

$$\text{Imp} = Z = \sqrt{\left(pL - \frac{1}{pK}\right)^2 + R^2}$$

[Kelvin]

R = Resistance ; $\left(pL - \frac{1}{pK}\right)$ = Reactance.

If there is no capacity in series—i.e., a conducting circuit throughout,

$$\text{Imp} = \sqrt{p^2 L^2 + R^2}$$

t = time

R.M.S. volts and ampères are applicable here.

If the units are henrys, farads and ohms the impedance is equivalent to ohms.

See also 19.

SUBJECT	FORMULA	NOTES
18. Exponential or Logarithmic Function.	<p>The equation $y = e^x$ or, $\log_e y = x$</p> <p>represents a law of variation of common occurrence in nature.</p> <p>For instance, in the form $y = e^{-at}$</p> <p>where a is a constant property chosen, the equation represents:</p> <p>(1) The charge y at any time t in a condenser which is leaking through a resistance;</p> <p>(2) The curve through the successively decreasing maxima of a damped oscillation in a circuit of constant resistance.</p> <p>The equation $y = e^{-ax} \sin bx$</p> <p>represents a damped train of waves or oscillation.</p> <p>The equation giving the current at any moment in a damped oscillation is</p> $i = I e^{-at} \sin 2\pi nt.$ <p>[Kelvin]</p> <p>The frequency of a free oscillation in a circuit not coupled to any other is</p> $n = \sqrt{(4LK - R^2K^2)}/4\pi LK$ <p>Or if R^2K^2 small and if K and L in C.G.S. Units</p> $n = 1/2\pi \sqrt{KL}$ <p>or $n = 159200/\sqrt{KL}$ if K in microfarads L in microhenrys</p>	<p>$e = 2.71828$ and is the base of Napierian logarithms.</p> <p>NOTE.—For oscillations to be possible R must be less than $\sqrt{4L/K}$.</p> <p>n is in complete cycles per second.</p> <p>$\lambda = v/n = 1885 \sqrt{KL}$ metres.</p>
19. Oscillatory Current		
Frequency.		

Damping,
Logarithmic Decrement.

If I_1, I_2, I_3 , etc., be successive positive maximum values of current

$$I_1/I_2 = I_2/I_3 = \dots = \epsilon^{\delta T}$$

$$\text{and } I_2/I_1 = I_3/I_2 = \dots = \epsilon^{-\delta T} = \epsilon^{-\delta}$$

$$dT = \log_e (I_1/I_2) = \delta, \text{ and } d = n\delta$$

hence (see above)

$$i = I\epsilon^{-\delta t} \sin 2\pi nt$$

is the equation to an oscillatory current having log.

dec = δ per cycle

also if I_m be the m th maximum

$$I_m/I_1 = \epsilon^{-(m-1)\delta}$$

since I_m is I_1 multiplied by $(m-1)$ factors each = $\epsilon^{-\delta}$

Thus when the energy has fallen to 1/100 of that of first maximum and the current therefore to 1/10

$$m = \frac{2.3026 + \delta}{\delta} = \text{a certain number of cycles.}$$

Damping of Spark Circuit.

In a circuit containing a gaseous section or spark, the resistance in general increases with the decrease of current; hence the decrement increases as the current dies out and the law is not logarithmic.

From experimental determinations it is known that the decrement of a spark circuit is approximately a straight line and not a logarithmic curve—i.e.:

$$I_1 - I_2 = I_2 - I_3 = \text{constant} = D.$$

[Zenneck]

Hence

$$I_n = I_1 - (n-1)D$$

and the spark is extinguished and the current stops when

$$(n-1)D = I_1 \text{ or } > I_1$$

T = period.
 δ = log. Decrement per whole period.

Also, $\delta = R/2nL$.

This gives the useful length of a wave train when the decrement is known.

SUBJECT

Resonance Curve.

FORMULA

If a wavemeter—i.e., a circuit having a standardised variable capacity, an inductance, and an indicator of current (usually a hot wire ammeter) in series—be placed so that current is induced in it by the action of another oscillating circuit, the current so induced varies with the nearness of the natural frequency of the wavemeter circuit to that of the inducing current. The curve obtained by plotting values of the square of the current in the wavemeter (I_s^2) against corresponding values of natural frequency of the wavemeter circuit (n_2) is called a resonance curve. When the frequency of the wavemeter is equal to that of any wave existing in the exciting circuit the current in the wavemeter runs up to a maximum and there is a peak on the curve. From the form and position of this peak or peaks the character of the exciting oscillation can be deduced. For instance, the frequency and damping of the exciting waves can be determined. [Bjerknes]

Determination of Decrement.

To determine the logarithmic decrement of a wave train or oscillation,

If δ_1 , δ_2 be the log. decrements of exciting circuit and wavemeter (the latter is small and is usually known), I_r be the wavemeter current at top of peak, its frequency being n_1 , and I_s be current at a point near the top (frequency n_2) (say $I_s^2 = \frac{3}{4} I_r^2$), then

$$\delta_1 + \delta_2 = 2\pi \left(1 - \frac{n_2^2}{n_1^2} \right) \cdot \frac{I_s}{\sqrt{I_r^2 - I_s^2}}.$$

It is not necessary to plot the whole curve since the measurement of the current I_r and I_s at frequencies n_1 , n_2 , is sufficient to solve the equation.

NOTES

Wavemeter Indicator. A telephone is often used to find wave-lengths or frequencies only; the reading of the wavemeter for maximum loudness being the wave-length of the exciting oscillation.

This gives the decrement δ_1 of the exciting oscillation if δ_2 be known. In a good wavemeter δ_2 is very small and may be put $= 0$.

The decrement may also be measured directly by the *Marconi* or the *Kloster* Decimeters.

Angle of Lag.

If the current in an alternating (or oscillating) circuit is always behind, or before, the voltage in arriving at corresponding values, the current is said to lag, or lead, and there is a difference of phase between current and voltage. The amount of phase lead is measured by the difference in the phase angles of the harmonic motions representing current and voltage; this angle ϕ is called the angle of lag, or lead,

$$\tan \phi = \text{Reactance/Resistance} = \left(pL - \frac{1}{pK} \right) / R.$$

Power Factor.

The power taken in, or given out and dissipated by a circuit in which the phase difference is ϕ is

$$P = \cos \phi (IE)$$

$$\cos \phi = \frac{\text{Resistance}}{\text{Impedance}} = \frac{R}{\sqrt{\left(pL - \frac{1}{pK} \right)^2 + R^2}} = \frac{\delta}{\pi}$$

Hence the power taken by an oscillating circuit

$$P = \frac{\delta}{\pi} (IE).$$

I and E are effective or hot-wire instrument values. $\delta = \log. \text{dec.}$ Hence, when δ small $\cos \phi$ is small and power is small, and when δ large, other things being equal, the power taken is large.

20. Coupled Circuits

k = coefficient of coupling, or simply the coupling

M = mutual inductance of the two circuits

L_1, L_2 = self inductances of the two circuits.

λ_0 = wave-length of each when free.

λ_1, λ_2 = wave-lengths of component currents present in *both* circuits after coupling.

δ_1, δ_2 = decrements of the circuits before coupling.

d_1, d_2 = decrements of the component currents after coupling.

NOTE.—The coupling depends not only on the Mutual Inductance but also on the Self-Inductances of both circuits.

SUBJECT	FORMULA	NOTES
<i>Coupled Circuits—cont.</i>	$k = M / \sqrt{L_1 L_2}$ $\lambda_1 = \lambda_0 \sqrt{1 - k}$ $\lambda_2 = \lambda_0 \sqrt{1 + k}$ $d_1 = (\delta_1 + \delta_2) / (2 \sqrt{1 - k})$ $d_2 = (\delta_1 + \delta_2) / (2 \sqrt{1 + k})$ <p>For the determination of k we may use</p> $k^2 = \frac{\lambda_2^2 - \lambda_1^2}{2\lambda_0^2}$ <p>or less accurately</p> $k = (\lambda_2 - \lambda_1) / \lambda_0.$	<p>Exact only in case of uniform (or undamped) current; approximate for slightly damped circuits with loose coupling—<i>i.e.</i>, less than $k = 0.05$, or 5 per cent.</p> <p>Measurements of λ_0, λ_1, and λ_2 with a wavemeter give k.</p>
21. Transmission . . .	I_1 = sending antenna current. I_2 = receiving antenna current. h_1 = height of sending antenna. All in kilometres. h_2 = height of receiving antenna. " " λ = wave-length. " " d = distance between stations. α = dissipation constant = 0.0015 in daylight over sea.	<p>Receiving antenna supposed to have resistance about 25 ohms; which is common in practice.</p> <p>A current of 40 micro-amperes in the receiving antenna is necessary for good reception with ordinary detectors, but with audion amplifiers and similar arrangements much less is required</p>
22. Efficiency of Transmitting Aerial-Earth Circuit	$I_2 = 4.25 I_1 \frac{h_1 h_2}{\lambda d} \cdot e^{-\alpha d} / \sqrt{\lambda}.$ <p>[Austin]</p> <p>To find the efficiency of a transmitting antenna set up a small antenna at a few wave-lengths distant from the station. Put sensitive hot-wire ammeter in this antenna. Measure the current i, received when the current I_1, is in the station antenna. Lower</p>	

the station antenna about 10 per cent. of its height. Measure i_1 and i_2 . In both cases the power P supplied to the station antenna and the wave-length must be made the same. Then, approximately,

$$\text{Efficiency} = \eta_a = i_1^2 \frac{I_1^2 - I_2^2}{I_1^2 i_2^2 - I_2^2 i_1^2}.$$

Also if R be joulean resistance, and r be radiation of the antenna—earth circuit

$$R = P \frac{i_2^2 - i_1^2}{I_1^2 i_2^2 - I_2^2 i_1^2}$$

$$r = P \frac{i_1^2}{I_1^2} \cdot \frac{I_1^2 - I_2^2}{I_1^2 i_2^2 - I_2^2 i_1^2}.$$

[Erskine-Murray]

$P = 2\pi n \delta L I^2$, where L is the inductance of the antenna.

These formulæ are subject to some small corrections not given here.

23. Rope, Strength of

Rough rule for all cordage except coir
Safe working = c^3 cwts., where c = circumference in inches:

“ for wire ropes (hemp core) = $9 c^2$ cwts.

“ steel rope (wire core) = $16 c^2$ cwts.

These are only roughly approximate.

“ “ “ “ “

24. Elongation of Stays

All-wire rope. Elongation $0.25 \times S/c^2$ %

Wire rope with one main hemp core.

“ $0.3 \times S/c^2$ %

Wire rope with main hemp core, and hemp core in each strand.

“ $0.5 \times S/c^2$ %

S = load in tons.

c = circumference in inches.

25. Weight of Wire Rope.

Weight in lbs, per fathom
= square of circumference in inches.

SUBJECT	FORMULA	NOTES
26. Strength of Materials.		
Mild or Structural Steel	<p>In Tension. Compression. Shear.</p> <p>6 6 3.7 tons per sq. in.</p>	
Oregon Fir	<p>{ 1,200 with grain lbs. per sq. in.</p> <p> 300 across grain " "</p>	
Red Pine	<p>{ 800 with grain " "</p> <p> 200 across grain " "</p>	
27. Miscellaneous	<p>1 Atmosphere = 14.7 lbs. per sq. inch. = 1 kilogram per sq. cm.</p> <p>1 Radian = 57.29°</p> <p>ϵ = (base of Napierian Logs.) = 2.7183.</p> <p>Common Log. $\times 2.3026$ = Napierian Log</p>	
	A man can work about $\frac{1}{8}$ h.p.	
	For other data see Tables following.	

INTERNATIONAL UNITS AND SYMBOLS.

(The symbols have been taken by special permission from the report of the International Electrotechnical Commission. Copies of this report may be obtained from the General Secretary, 28, Victoria Street, London, S.W.)

RULES FOR QUANTITIES.

(a) Instantaneous values of electrical quantities which vary with the time to be represented by small letters. In case of ambiguity, they may be followed by the subscript "t."

(b) Virtual or constant values of electrical quantities to be represented by capital letters.

(c) Maximum values of periodic electrical and magnetic quantities to be represented by capital letters followed by the subscript "m."

(d) In cases where it is desirable to distinguish between magnetic and electric quantities, constant or variable, magnetic quantities to be represented by capital letters of either script, heavy-faced or any special type. Script letters to be only employed for magnetic quantities.

(e) Angles to be represented by small Greek letters.

(f) Dimensionless and specific quantities to be represented, wherever possible, by small Greek letters.

SYNOPSIS OF UNITS.

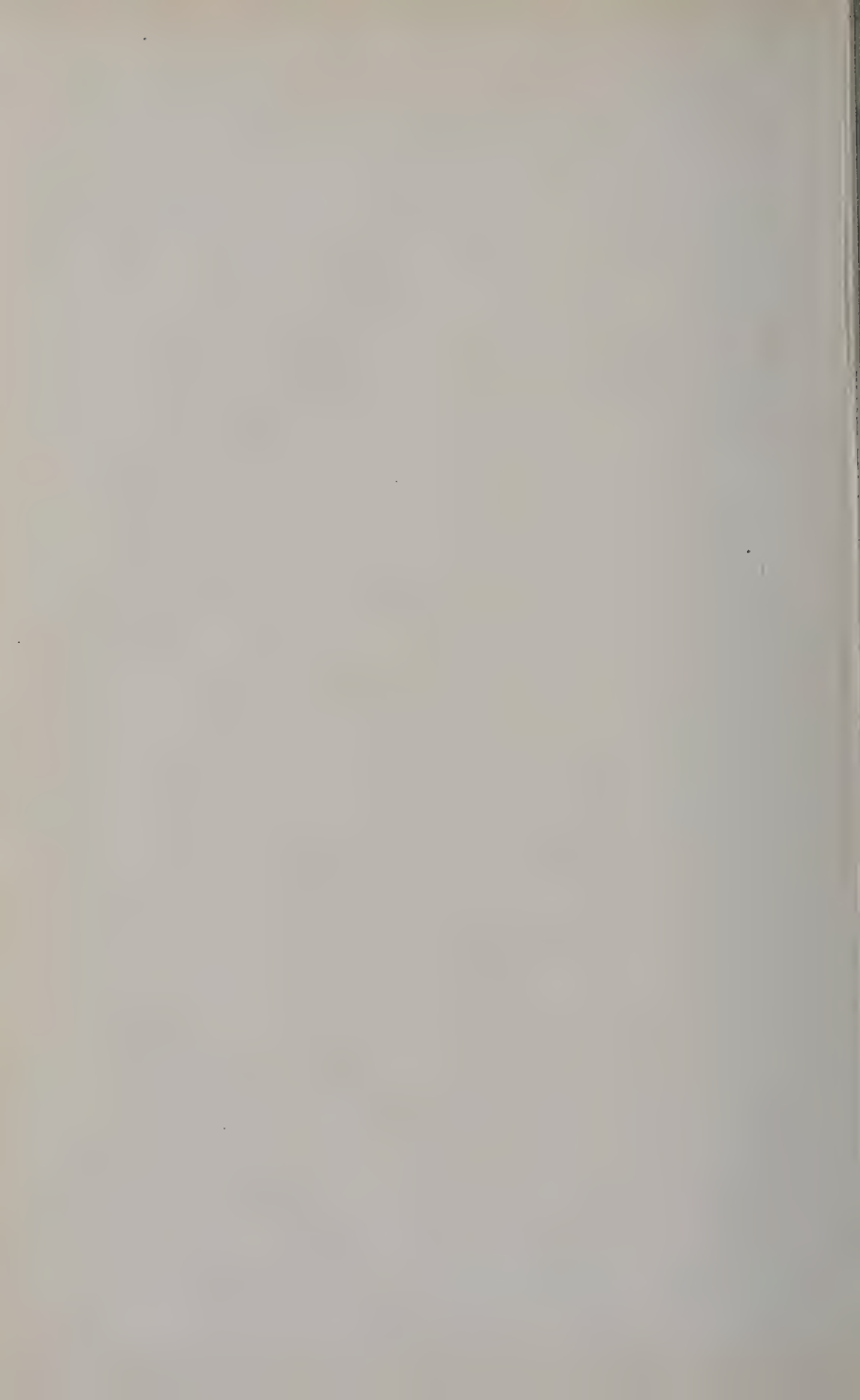
I.—FUNDAMENTAL.		Dimensions
Length—Mass—Time		L—M—T
II.—DERIVED MECHANICAL.		
Area	$=L \times L$	L^2
Volume	$=L \times L \times L$	L^3
Velocity	$V=L \div T$	LT^{-1}
Momentum	$=\text{mass} \times \text{velocity}$	$LM T^{-1}$
Acceleration	$A=\text{velocity} \div \text{time}$	LT^{-2}
Force	$F=\text{mass} \times \text{acceleration}$	$LM T^{-2}$
Work	$W=\text{force} \times \text{length}$	$L^2 M T^{-2}$
Energy (kinetic)	$=\frac{1}{2} \text{mass} \times \text{velocity}^2$	$L^2 M T^{-2}$
III.—DERIVED ELECTRO-STATIC.		
Quantity	$q=vQ=\sqrt{\text{force} \times \text{distance}^2}$	$L^{\frac{3}{2}} M^{\frac{1}{2}} T^{-1}$
Current	$c=vI=\text{quantity} \div \text{time}$	$L^{\frac{3}{2}} M^{\frac{1}{2}} T^{-2}$
Electro-motive Force } Difference of Potential }	$e=\frac{E}{v}=\text{work} \div \text{quantity}$	$L^{\frac{1}{2}} M^{\frac{1}{2}} T^{-1}$
Resistance	$r=\frac{R}{v^2}=\text{electro-motive force} \div \text{current}$	$L^{-1} T$
Capacity	$k=v^2K=\text{quantity} \div \text{electro-motive force}$	L
Sp. Ind. Capacity	$=\text{quantity} \div \text{another quantity}$	a numeral
IV.—DERIVED MAGNETIC.		
Strength of Pole	$m=\sqrt{\text{force} \times \text{distance}^2}$	$L^{\frac{3}{2}} M^{\frac{1}{2}} T^{-1}$
Quantity of Magnetism		$L^{\frac{3}{2}} M^{\frac{1}{2}} T^{-1}$
Moment of a Magnet		$L^{\frac{3}{2}} M^{\frac{1}{2}} T^{-1}$
Intensity of Magnetisation		$L^{\frac{3}{2}} M^{\frac{1}{2}} T^{-1}$
Magnetic Potential	$I=\text{moment of magnet} \div \text{volume}$	$L^{\frac{1}{2}} M^{\frac{1}{2}} T^{-1}$
V.—DERIVED ELECTRO-MAGNETIC.		
Current	$C=\frac{c}{v}=\text{intensity of field} \times \text{length}$	$L^{\frac{1}{2}} M^{\frac{1}{2}} T^{-1}$
Quantity	$Q=\frac{q}{v}=\text{current} \times \text{time} = CT$	$L^{\frac{1}{2}} M^{\frac{1}{2}}$
Electro-motive Force } Difference of Potential }	$E=ev=\text{work} \div \text{quantity}$	$L^{\frac{3}{2}} M^{\frac{1}{2}} T^{-2}$
Resistance	$R=r v^2=\text{electro-motive force} \div \text{current}$	$L T^{-1}$
Capacity	$K=\frac{k}{v^2}=\text{quantity} \div \text{electro-motive force}$	$L^{-1} T^2$
Sp. Ind. Capacity	$=\text{displacement} \div \text{force}$	$L^{-2} T$
Self-induction, or } "Quadrant" }	$L_s=\frac{ET}{C}=\frac{\text{energy}}{C^2}=\frac{H \times (\text{length})^2}{C}$	L
Ratio of electro-magnetic to electro-static unit of quantity, $v=3 \times 10^{10}$ centimetres per second approximately.		$L T^{-1}$



CAPTAIN EDWIN H. ARMSTRONG, U.S.N.

(For biographical details, see page 1083.)

[To face page 1040.]



PRACTICAL ELECTRIC UNITS.

RESISTANCE, R.—The OHM is equal to 10^9 C.G.S.* units of resistance. It has been agreed to take as the practical unit of resistance the resistance of a specified column of mercury (B.A. Committee on Electrical Standards, 1892; Report of Electrical Standards Committee of the Board of Trade, October 27th, 1892). This specified column of uniform cross-section is defined by its length, 106.3 cm. at 0° C., and its mass, 14.4521 grammes. If the mass of 1 cc. of water at 4° C. be 1 gramme, the area of the cross-section of such a column will be 1 sq. mm. Thus 1 ohm is the resistance of a column of mercury at 0° C. 14.4521 grammes in mass, and 106.3 cm. in length. For industrial purposes standards in solid metal having the same resistance as this specified column are made and deposited at the Board of Trade and elsewhere. These standards are from time to time compared together, and have their values redetermined in terms of a mercury column.

To obtain the relation between resistances measured in B.A. units, and resistances measured in ohms, we have—

$$1 \text{ B.A. unit} = .9866 \text{ ohm.}$$

$$1 \text{ ohm} = 1.01358 \text{ B.A. Units.}$$

Thus, to reduce B.A. units to ohms, we have to multiply by .9866 (*i.e.*, deduct 1.34 per cent.). German silver coils having a temperature coefficient of resistance of .044 per cent. per 1° C., adjusted to be B.A. units at 0° C., become ohms at 30.5° C. Platinum silver coils, having a temperature coefficient of .028 per cent. per 1° C., adjusted to be B.A. units at 0° , become ohms at 47.8° C.

The MEGOHM = one million ohms.

The MICROHM = one-millionth ohm.

The *Specific Resistance of Mercury* is thus $.9407 \times 10^{-4}$ ohms = 94.07 microhms.

The *Legal Ohm* of the Paris Congress, April, 1884, now superseded by the above B.O.T. ohm, is defined as the resistance of a column of mercury 106 cm. long, and 1 sq. mm. section at 0° C.

ELECTRO-MOTIVE FORCE, E.—The VOLT is equal to 10^8 C.G.S.* units of electro-motive force. The E.M.F. of a Clark cell at 15° C. is 1.434 volts. (See *B.O.T. Report*.) A Daniell cell, copper in copper sulphate solution and zinc in dilute sulphuric acid, gives about 1.04 volt. Electro-motive force is equivalent

* Electro-magnetic system.

to the difference of potential between two points. The VOLT is the electro-motive force which maintains a current of 1 ampère in a conductor whose resistance is the ohm.

CURRENT, I.—The AMPÈRE is the current, of which the absolute measurement is 10^{-1} C.G.S.* units.

One ampère decomposes '00009324 gramme of water (H_2O) per second, or deposits 1'118 milligrms. of silver per sec. = 4'025 grms. per hour.

The MILLIAMPÈRE = $\frac{1}{1000}$ of an ampère.

QUANTITY, Q.—The COULOMB is equal to 10^{-1} C.G.S.* units of quantity. It is the quantity of electricity conveyed by an ampère in a second.

CAPACITY, K.—The FARAD is equal to 10^{-9} C.G.S.* units of capacity. It is the capacity defined by the condition that a coulomb charges it to the potential of a volt.

The MICROFARAD, *mfd.* = 10^{-15} C.G.S.* units of capacity, or one-millionth of a Farad.

SELF-INDUCTION, L^s.—The SECOHM,† Quadrant or Henry is equal to 10^9 centimetres or earth's quadrant.

POWER, P_w.—The WATT is equal to 10^7 C.G.S.* units of power. It is the power conveyed by a current of an ampère through a conductor whose ends differ in potential by a volt; or, in other words, the rate of doing work when an ampère passes through an ohm, and it is equal to 10^7 ergs per second, or a Joule per second ($\frac{1}{746}$ of a H.P.).

$$\therefore E \times I = I^2 \times R = E^2 \div R = \text{Watts,}$$

$$\text{and } \frac{E \times I}{746} = \frac{I^2 \times R}{746} = \frac{E^2}{746 R} = \text{Horse-power.}$$

The Board of Trade Commercial Unit is 1,000 volt-ampère-hours or 1,000 Watt-hours; 10 ampères at 100 volts an hour = one B.T. unit, or equal to 1'34 H.P. working for one hour.

HEAT OR WORK, WJ.—The JOULE is equal to 10^7 C.G.S.* units of work or ergs. It is the work done, or heat generated by a Watt in a second—i.e., the work done or heat generated in a second by an ampère flowing through the resistance of an ohm, or the heat generated by a Coulomb running down through a difference of potential of 1 volt. It is therefore the amount of heat equivalent to 10^7 ergs. Assuming Joule's equivalent = 41,890,000 ergs, it is the heat necessary to raise '24 gramme of water $1^\circ C$.

$$\therefore E I T = I^2 R T = E^2 T \div R = E Q \text{ Joules.}$$

And since 1 H.P. = 550 ft.-lbs. per second,

$$W = \frac{550}{746} E Q = '7373 E Q \text{ ft.-lb.}$$

* Electro-magnetic system.

† The "secohm" and "quadrant" were the terms used for self-induction until the "Henry" was officially adopted.

HEAT UNITS.

HEAT UNITS.—The French unit of heat is the quantity of heat required to raise 1 gramme mass of water, from 4° (temperature of maximum density) to 5° Cent.=1 gramme degree Cent.= '00397 British heat unit. The kilogramme degree Cent. in engineering is called the CALORIE. It is=3'968 British units of heat (B.Th.U.).

The BRITISH THERMAL UNIT is the amount of heat required to raise 1 pound of water, from 60° Fah. to 61°=1 pound degree Fah.=0'2519 calories.

JOULE'S EQUIVALENT,* J, is the amount of ENERGY equivalent to a UNIT OF HEAT. Then, for

1 g.-deg. Cent., $J = 41\cdot89 \times 10^6$, say 42×10^6 ergs.

1 Calorie $J = 41\cdot89 \times 10^9$, say 42×10^9 ergs.

1 lb.-deg. Cent., $J = 1\cdot92 \times 10^{10}$ ergs, or 1,400 ft.-lbs.

1 lb.-deg. Fah., $J = 1\cdot07 \times 10^{10}$ ergs, or 778 ft.-lbs.

THE HEAT GENERATED in time, T, by a current, I, through a wire of resistance, R, is

$$\frac{I^2 R T}{J} \quad \frac{E I T}{J}$$

where $J = 42 \times 10^6$ and I, R, and E are expressed either in absolute electro-magnetic or electro-static units, and T in seconds.

For practical use, when I is ampères, R ohms, E volts, and T secs., the heat generated in time $T = I^2 R T \times 0\cdot24$; or $0\cdot24 E I T$ calories. Or, '0009 E I T British units.

* See *Science Abstracts*, vol. ii., p. 611, for Rowland's, Griffith's, Schuster's, or the latest values for J.

CONVERSION TABLES.

(By permission of the Proprietors of the Electrician.)

Multiply by		Multiply by	
To reduce	kilometres to miles	62	To reduce tons per sq. foot to head of
"	kilometres to yards.	1100 (1093·6)	water (metres)
"	metres to yards	1·1	" tons per sq. foot to atmo-
"	metres to feet.	3·3	spheres
"	centimetres to inches	·4	" lbs. per sq. inch to tons per
"	millimetres to inches	·04	sq. foot
"	millimetres to mils.	40 (39·4)	" lbs. per sq. inch to kilogrammes
"	miles to kilometres	1·6	per sq. cm.
"	miles to metres	1609	" lbs. per sq. inch to grammes
"	yards to kilometres	·0009	per sq. cm.
"	yards to metres	·9	" lbs. per sq. inch head of water
"	feet to metres.	·3	(feet)
"	inches to centimetres	2·54	" lbs. per sq. inch to head of
"	inches to millimetres	25 (25·4)	water (metres)
"	mils. to millimetres	·025	" lbs. per sq. inch to atmo-
"	sq. metres to sq. yards	1·2	spheres
"	sq. metres to sq. feet	11 (10·76)	" kilogrammes per sq. cm. to
"	sq. centimetres to sq. inches	·155	tons per sq. foot
"	sq. millimetres to sq. inches	·0015	" kilogrammes per sq. cm. to
"	sq. yards to sq. metres	·83	lbs. per sq. inch
"	sq. feet to sq. metres	·09	" kilogrammes per sq. mm. to
"	sq. inches to sq. centimetres	6·45	lbs. per sq. inch
"	sq. inches to sq. millimetres	645	" grammes per sq. cm. to lbs.
"	cub. metres to cub. yards	1·3	per sq. in.
"	cub. metres to cub. feet	35·3	" head of water (metres) to tons
"	cub. cms. to cub. inches	·06	per sq. foot
"	cub. yards to cub. metres	·76	" head of water (feet) to tons
"	cub. feet to cub. metres	·03	per sq. foot
"	cub. inches to cub. cms.	16·4	" head of water (metres) to lbs.
"	kilogrammes to tons	·001	per sq. inch
"	kilogrammes to cwt	·02	" head of water (feet) to lbs. per
"	kilogrammes to pounds	2·2	sq. inch
"	kilogrammes to ounces	35 (35·3)	" atmosphere to tons per sq. ft.
"	grammes to ounces	·035	" atmosphere to lbs. per sq. in.
"	grammes to grains	15·4	" grains per sq. inch to dynes
"	milligrammes to grains	·015	per sq. cm.
"	tons to kilogrammes	1000 (1016)	" dynes per sq. cm. to grains
"	cwt. to kilogrammes	50 (50·8)	per sq. inch
"	pounds to kilogrammes	·45	" carrels to candles
"	pounds to grammes	453 (453·6)	" candles to carrels
"	ounces to grammes	28·35	" English candles to German . .
"	grains to grammes	·65	" German candles to English . .
"	grains to milligrammes	65 (64·8)	" *joules to ergs
"	lbs. avoird. to grains troy	7000	" joules to foot lbs.
"	gallons to cub. feet	·16	" joules to kilogrammes
"	gallons to cub. metres	·0045	" joules to lbs. deg. F.
"	gallons to litres	4·5	" joules to calories
"	gallons of water to lbs.	10	" calories to joules
"	cub. feet to gallons	6·2	" lbs. deg. F. to joules
"	cub. metres to gallons	220	" kilogrammes to joules
"	litres to gallons	·22	" foot lbs. to joules
"	lbs. of water to gallons	·1	" lbs. deg. F. to foot lbs.
"	litres to cub. feet	·035	" lbs. deg. F. to kilogrammes
"	litres of water to lbs.	2·2	" lbs. deg. F. to calories
"	cub. feet to litres	28·3	" calories to lbs. deg. F.
"	lbs. of water to litres	·454	" kilogrammes to lbs. deg. F.
"	cub. feet of water to lbs.	62·3 (62·27)	" kilogrammes to calories
"	lbs. of water to cub. feet	·016	" kilogrammes to foot lbs.
"	feet per minute to miles per		" foot lbs. to kilogrammes
"	hour	·0113	" calories to kilogrammes
"	feet per minute to metres per		" H. P. to watts
"	sec.	·005	" H. P. to foot lbs. per minute
"	miles per hour to feet per		" H. P. to kilogrammes per
"	minute	88	sec.
"	metres per sec. to feet per		" watts to foot lbs. per minute
"	minute	197	" watts to kilogrammes per
"	tons per sq. foot to kilo-		sec.
"	grammes per sq. cm.	1·09	" centimes per car-kilometre to
"	tons per sq. foot to lbs. per sq.		pence per car-mile
"	in.	15·5	" pence per car-mile to centimes
"	tons per sq. foot to head of		per car-kilometre
"	water (feet)	36	

* One joule=one watt second.

USEFUL DATA

RELATION BETWEEN SPARKING DISTANCES AND IMPRESSED VOLTAGE.

In the Standardisation Rules of the American Institute of Electrical Engineers, the following table of sparking distances in air between opposed sharp needle points for various effective sinusoidal voltages is given :—

Kilovolts sq. root of mean sq.	Inches sparking distance.	Kilovolts sq. root of mean sq.	Inches sparking distance.	Kilovolts sq. root of mean sq.	Inches sparking distance
5	0.225	80	7.1	200	20.25
10	0.47	90	8.35	210	21.30
15	0.725	100	9.6	220	22.35
20	1.0	110	10.75	230	23.40
25	1.3	120	11.85	240	24.45
30	1.625	130	12.90	250	25.50
35	2.0	140	13.95	260	26.50
40	2.45	150	15.0	270	27.50
45	2.95	160	16.5	280	28.50
50	3.55	170	17.10	290	29.50
60	4.65	180	18.15	300	30.50
70	5.85	190	19.20		

Recent tests show that needle-point gaps are not reliable above 100,000 volts. A sphere gap voltmeter is recommended by S. W. Farnsworth and C. L. Fortescue (Proc. Am. Inst. E. E., Feb., 1913), and the tests made by the latter and L. W. Chubb give the following results :—

Diam. of Spheres in C.M.	Gap in C.M.	Volts.
25	2	60,000
25	4	112,000
25	6	165,000
50	8	218,000
50	10	260,000
50	14	350,000

SPECIFIC ELECTRICAL RESISTANCE TABLE.

METALS, ALLOYS, ELECTROLYTES, INSULATORS.

(By permission of the Proprietors of the Electrician.)

METALS AND ALLOYS.

Metal or Alloy.	Resistance Compared with Copper (approx.)	Specific Resistance in C.G.S. Units at 0° C.	Temperature Coefficient per 1° C.
Aluminium, annealed ...	2	2,946	0.0039
„ hard-drawn...	2	3,160	0.0039
Antimony, pressed ...	22½	35,900	0.0039
Bismuth, pressed...	83	132,650	0.0054
Cadmium ...	6½	6,800	—
Carbon, retort ...	42,000	67 × 10 ⁶	—
„ arc light (Carré)	4,400	7 × 10 ⁶	—0.0005
„ glow lamp (Edison-Swan)	2,500	4 × 10 ⁶	—0.00054
Copper, soft ...	1	1,580	0.00388
„ hard ...	1	1,616	0.00388
German silver (Cu 4 parts, Ni 2 parts, Zn 1 part)	13½	21,170	0.00044
Gold, purest soft ...	1½	1,952	0.00336
„ hard-drawn ...	1½	2,118	0.00365
Iron ...	6	9,611	0.0048
Lead, pressed ...	12½	19,850	0.00387
Lead peroxide, chemically prepared	4 × 10 ⁴	5590 × 10 ⁶	—*
Lead peroxide, electrolytically prepared	4 × 10 ⁶	6780 × 10 ⁶	—*
Mercury, liquid ...	59	94,070	0.00072
Manganin (Cu 84 per cent., Mn 12 per cent., Ni 4 per cent.)	26	42,000	0° to 10° C. = +0.000025
			10° to 20° C. = +0.000014
			20° to 30° C. = +0.000003
			30° to 40° C. = 0
			40° to 50° C. = —0.000003
Manganese copper (Cu 70 per cent., Mn 30 per cent.)	63	100,600	50° to 60° C. = —0.000006
			0.00004
Nickel, pure ...	7½	12,290	0.0048
Platinum, pure annealed ...	5	8,222	0.0032
Platinoid (German silver + 1 or 2 per cent. of Tungsten)	27½	43,600	0.00025
Platinum iridium (Pt = 80 per cent., Ir = 20 per cent.)	18½	29,375	0.00089
Platinum silver (Pt = 33 per cent., Ag = 66 per cent.)	16½	26,820	0.00018
Phosphor bronze, commercial ...	5½	8,479	0.00064
Silver, annealed ...	—	1,521	0.00377
„ hard-drawn ...	—	1,652	—
Tin, pure ...	6	9,565	0.004
„ pressed ...	8½	13,360	0.0036
Zinc, pressed ...	3½	5,690	0.0036

* John Shields, *Chem. News*, "No alteration observed on heating up to 115° C."

SPECIFIC INDUCTIVE CAPACITIES.

(By permission of the Proprietors of the Electrician.)

The specific inductive capacity of a substance is the ratio of the capacity of a condenser when the plates are separated by this substance to the capacity of the same condenser when its plates are separated by air at about 760 mm. pressure—no change being made in the condenser except in the substitution of air for the substance in question.

The determination of the specific inductive capacity of a substance does not admit of great accuracy on account of the phenomenon of absorption or soaking in of the charge which causes an apparent diminution * in the specific inductive capacity for charges of short duration as compared with those of long duration. The figures given in the following table should, therefore, only be regarded as approximately correct.

Substance.	Specific Inductive Capacity.	Authority.
Flint glass, very light, density 2.87	6.61	J. Hopkinson
„ light, density 3.2	6.72	J. Hopkinson
„ „ „	3.01	Wüllner
„ dense, density 3.66	7.38	J. Hopkinson
„ „ „	3.05	Wüllner
„ extra dense, density 4.5	9.90	J. Hopkinson
„ extra dense	3.16	Wüllner
Crown glass, hard, density 2.485	6.96	J. Hopkinson
„ „ „	3.11	Wüllner
Plate glass	8.45	J. Hopkinson
White mirror glass	5.83 to 6.34	Wüllner
„ „ „	5.83	Schiller
Straw-coloured glass	6.34	Siemens
„ „ „	2.96 to 3.66	Schiller
Paraffin wax	4.12	Siemens
„ „ „	1.977	Gibson & Barclay
„ „ „	1.96	Wüllner
„ „ „	2.32	Boltzman
„ „ „	1.68 to 1.92	Schiller
„ „ „	2.19 to 2.34	Siemens
Indiarubber, pure	2.12	Schiller
„ „ „	2.34	Siemens
„ vulcanised	2.69	Schiller
„ „ „	2.94	Siemens
Resin	2.55	Boltzman
Ebonite	2.21 to 2.76	Schiller
„ „ „	3.15	Boltzman
„ „ „	2.56	Wüllner
„ „ „	2.28	Gordon
Sulphur	2.88 to 3.21	Wüllner
„ „ „	3.84	Boltzman
„ „ „	2.58	Gordon
Shellac	2.74	Gordon
„ „ „	2.95 to 3.73	Wüllner
Gutta-percha	3.15	Boltzman
„ „ „	4.2	Faraday
„ „ „	2.46	Gordon
Mica	5.0	Faraday
Pitch	1.8	Faraday
Petroleum, spirit, Field's	1.92	J. Hopkinson
„ essence of	2.17	Perot
„ oil, Field's	2.07	J. Hopkinson
„ common	2.10	J. Hopkinson
„ „ „	2.04 to 2.07	Silow
„ „ neutral at 21° C.	2.26	E. B. Rosa
Turpentine, commercial	2.23	J. Hopkinson
„ „ at 18.6° C.	2.43	E. B. Rosa
„ oil of, at 17.1° C.	1.94	Quincke
„ „ „	2.16 to 2.22	Silow
Castor oil	4.78	J. Hopkinson
Sperm oil	3.02	J. Hopkinson
„ „ at 20° C.	3.09	E. B. Rosa
Benzine	2.20	Silow
„ „ „	2.24	Perot
„ „ at 21° C.	2.45	E. B. Rosa
Bisulphide of carbon at about 11° C.	1.97 to 2.23	Quincke
„ „ „	1.81	Gordon
Water at 14° C.	83.8	Tereschin
„ „ 25° C.	75.7	E. B. Rosa
Air at about 0.001 mm. pressure	0.94	Ayrton
„ „ 5 mm. „	0.9985	Ayrton
„ „ „	0.9994	Boltzman
Hydrogen at about 760 mm. pressure	0.9997	Boltzman
„ „ „	0.9998	Ayrton
Carbon dioxide at about 560 mm. pressure	1.0004	Boltzman
„ „ „	1.0008	Ayrton
Olefiant gas at about 760 mm. pressure	1.0007	Boltzman
Sulphur dioxide at about 760 mm. pressure	1.0037	Ayrton

* According to M. Perot the reverse is sometimes the case with impure liquids.

**TABLE SHOWING RELATIVE VALUES OF STANDARD,
BIRMINGHAM AND AMERICAN (BROWN & SHARPE)
WIRE GAUGES.**

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Tables, Data and Memoranda" for 1913 by H. R. Kempe, M.Inst.C.E.
Published by Crosby Lockwood & Son.

S.W.G.	B.W.G.	A.W.G.	Equivalent in Mils.	Equivalent in Mms.	S.W.G.	B.W.G.	A.W.G.	Equivalent in Mils.	Equivalent in Mms.
7/0			500	12.690	15	15	13	072	1.828
6/0			464	11.785		16		065	1.650
	0000	0000	460	11.683	16		14	064	1.625
			454	11.531		17		058	1.472
5/0			432	10.972			15	057	1.447
	000		425	10.794	17			056	1.421
		000	409	10.388			16	050	1.270
0000			400	10.159		18		049	1.244
	00		380	9.651	18			048	1.218
000			372	9.448			17	045	1.142
		00	365	9.271		19		042	1.066
00			348	8.839	19		18	040	1.016
	0		340	8.635	20		19	036	914.0
		0	325	8.254		20		035	888.6
0			324	8.229	21	21	20	032	812.4
1	1		300	7.620		22		030	761.7
		1	289	7.340			21	028.4	721.3
	2		284	7.213	22			028	710.9
2			276	7.010			22	025.3	612.6
	3		259	6.578		23		025	634.7
		2	257	6.527	23			024	609.3
3			252	6.400	24	24	23	022	558.5
	4		238	6.045	25	25	24	020	507.8
4			232	5.892	26	26	25	018	457.0
		3	229	5.816	27	27	26	016	406.2
	5		220	5.588	28	28	27	014	355.5
5			212	5.384	29	29		013	330.0
		4	204	5.181			28	012.2	310.0
	6		203	5.156	30	30		012	304.6
6			192	4.876	31		29	011	280.0
		5	182	4.622	32			010.8	274.3
	7		180	4.571	33	31	30	010	253.9
7			176	4.470	34	32	31	009	230.0
	8		165	4.191	35	33	32	008	203.1
		6	162	4.114	36	34	33	007	177.7
8			160	4.064	37			006.8	172.7
	9		148	3.759	38		34	006	152.3
9		7	144	3.657			35	005.6	142.2
	10		134	3.403	39	35	36	005	126.9
10		8	128	3.251	40			004.8	121.9
	11		120	3.047	41		37	004.4	111.8
11			116	2.946	42	36	38	004	101.5
		9	114	2.895	43		39	003.6	091.4
	12		109	2.768	44		40	003.2	081.3
12			104	2.641	45			002.8	071.3
		10	102	2.590	46			002.4	061.0
	13		095	2.412	47			002	050.7
13			092	2.336	48			001.6	040.6
		11	090	2.286	49			001.2	030.3
	14		083	2.108	50			001	025.3
14		12	080	2.032					

* WIRE TABLES—H.C. COPPER—ANNEALED.
E.S.C. Standard.

SIZE.	DIAMETER.		SECTIONAL AREA.		WEIGHT. (Minimum.)		RESISTANCE at 60° F. (Maximum.)		CURRENT CAPACITY.	
	Inch.	M/m.	Square Inch.	Square M/m.	Pounds.		Standard Ohms		Ampères at	
					Per 1000 Yards.	Per mile.	Per 1000 Yards.	Per mile.	1000 per Sq. inch.	I.E.E.
47	0.0020	0.0508	0.0000031	0.0002027	0.0356	0.0627	7805	13737	0.0031	This Column is compiled according to the Standards fixed by the Institution of Electrical Engineers.
46	0.0024	0.0610	0.0000045	0.0002919	0.0513	0.0902	5420	9540	0.0045	
45	0.0028	0.0711	0.0000062	0.0003973	0.0698	0.1228	3982	7009	0.0062	
44	0.0032	0.0813	0.0000080	0.0005188	0.0911	0.1604	3049	5366	0.0080	
43	0.0036	0.0914	0.0000102	0.0006567	0.1153	0.2030	2409	4240	0.0102	
42	0.0040	0.1016	0.0000126	0.0008109	0.1424	0.2506	1951	3434	0.0126	
41	0.0044	0.1118	0.0000152	0.0009810	0.1723	0.3032	1613	2336	0.0152	
40	0.0048	0.1219	0.0000181	0.0011674	0.2050	0.3609	1355	2385	0.0181	
39	0.0052	0.1321	0.0000212	0.0013701	0.2406	0.4235	1155	2032	0.0212	
38	0.0056	0.1424	0.0000248	0.0016241	0.3204	0.5639	867.3	1526	0.0283	
37	0.0060	0.1527	0.0000285	0.0019230	0.4115	0.7243	675.2	1188	0.0363	
36	0.0064	0.1630	0.0000324	0.0022927	0.5140	0.9047	540.5	951.3	0.0454	
35	0.0068	0.1734	0.0000364	0.0027522	0.6280	1.105	442.5	778.8	0.0544	
34	0.0072	0.1837	0.0000405	0.0032487	0.7533	1.326	368.9	649.2	0.0665	
33	0.0076	0.1940	0.0000448	0.0037670	0.8900	1.566	312.2	549.5	0.0785	
32	0.0080	0.2043	0.0000491	0.0043102	1.038	1.827	267.7	471.1	0.0916	
31	0.0084	0.2146	0.0000535	0.0048818	1.198	2.108	232.0	408.4	0.1057	
30	0.0088	0.2249	0.0000580	0.0054791	1.368	2.408	203.1	357.4	0.1207	
29	0.0092	0.2352	0.0000625	0.0060932	1.546	2.897	168.8	297.1	0.1453	
28	0.0096	0.2455	0.0000670	0.0067309	1.734	3.431	142.5	250.9	0.1720	
27	0.0100	0.2558	0.0000715	0.0073954	1.932	4.022	116.1	204.3	0.2112	This Column is compiled according to the Standards fixed by the Institution of Electrical Engineers.
26	0.0104	0.2661	0.0000760	0.0080842	2.139	5.075	96.36	169.6	0.254	
25	0.0108	0.2764	0.0000805	0.0088000	2.356	6.265	78.05	137.4	0.314	
24	0.0112	0.2867	0.0000850	0.0095301	2.583	7.581	64.51	113.5	0.380	
23	0.0116	0.2970	0.0000895	0.0102819	2.820	9.022	54.20	95.40	0.452	
22	0.0120	0.3073	0.0000940	0.0110573	3.067	12.28	39.82	70.09	0.516	
21	0.0124	0.3176	0.0000985	0.0118468	3.324	16.04	30.49	53.66	0.604	
20	0.0128	0.3279	0.0001030	0.0126507	3.591	20.30	24.09	42.40	0.718	
19	0.0132	0.3382	0.0001075	0.0134691	3.868	25.06	19.51	34.34	0.857	
18	0.0136	0.3485	0.0001120	0.0143020	4.155	30.09	15.55	23.85	1.010	
17	0.0140	0.3588	0.0001165	0.0151495	4.452	35.42	12.12	17.52	1.170	This Column is compiled according to the Standards fixed by the Institution of Electrical Engineers.
16	0.0144	0.3691	0.0001210	0.0160015	4.759	40.16	9.622	13.42	1.340	
15	0.0148	0.3794	0.0001255	0.0168680	5.076	45.49	7.423	10.60	1.520	
14	0.0152	0.3897	0.0001300	0.0177491	5.403	51.22	5.848	8.586	1.710	
13	0.0156	0.3999	0.0001345	0.0186448	5.740	57.44	4.578	6.492	1.910	
12	0.0160	0.4102	0.0001390	0.0195561	6.087	64.17	3.569	5.080	2.120	
11	0.0164	0.4205	0.0001435	0.0204826	6.444	71.40	2.787	4.072	2.340	
10	0.0168	0.4308	0.0001480	0.0214251	6.811	79.13	2.160	3.354	2.570	
9	0.0172	0.4411	0.0001525	0.0223836	7.188	87.36	1.661	2.650	2.810	
8	0.0176	0.4514	0.0001570	0.0233581	7.575	96.09	1.280	2.146	3.060	
7	0.0180	0.4617	0.0001615	0.0243486	7.972	105.32	0.969	1.774	3.320	This Column is compiled according to the Standards fixed by the Institution of Electrical Engineers.
6	0.0184	0.4720	0.0001660	0.0253551	8.379	115.05	0.740	1.491	3.590	
5	0.0188	0.4823	0.0001705	0.0263776	8.796	125.18	0.569	1.223	3.870	
4	0.0192	0.4926	0.0001750	0.0274161	9.223	135.81	0.431	0.9801	4.160	
3	0.0196	0.5029	0.0001795	0.0284706	9.660	146.94	0.329	0.7853	4.460	
2	0.0200	0.5132	0.0001840	0.0295411	10.107	158.57	0.250	0.6253	4.770	
1	0.0204	0.5235	0.0001885	0.0306276	10.564	170.70	0.190	0.5000	5.100	
1/0	0.0208	0.5338	0.0001930	0.0317301	11.031	183.33	0.144	0.3999	5.450	
1/0	0.0212	0.5441	0.0001975	0.0328486	11.508	196.46	0.110	0.3164	5.820	
1/0	0.0216	0.5544	0.0002020	0.0339831	11.995	210.09	0.085	0.2524	6.210	

* A Table showing data for B H curves will be found on page 1054.

WIRE TABLES—H.C. COPPER—ANNEALED.

E.S.C. Standard.

SIZE.	DIAMETER.		SECTIONAL AREA. (Nominal.)		WEIGHT. (Minimum.)		RESISTANCE at 60° F. (Maximum.)		CURRENT CAPACITY.	
S.W.G.	Inch.	M/m.	Square Inch.	Square M/m.	Pounds.		Standard Ohms.		Ampères at	
					Per 1000 Yards.	Per mile	Per 1000 Yards.	Per Mile.	1000 per Sq. Inch.	I.E.E.
2/0	0.348	8.839	0.09511	61.36	1078	1897	0.2578	0.4537	95.11	108
3/0	0.372	9.449	0.1087	70.13	1232	2168	0.2256	0.3971	108.7	120
4/0	0.400	10.16	0.1257	81.09	1424	2506	0.1951	0.3434	125.7	135
3/25	0.043	1.092	0.00924	0.5965	10.9	19.2	26.53	46.7	0.924	2.452
3/23	0.052	1.321	0.01330	0.8580	15.69	27.61	18.43	32.4	1.330	3.307
3/22	0.060	1.524	0.01812	1.1680	21.35	37.57	13.54	23.8	1.812	4.258
3/20	0.078	1.981	0.02994	1.932	35.30	62.13	8.19	14.4	2.994	6.444
3/18	0.103	2.616	0.05323	3.4340	62.74	110.4	4.61	8.11	5.323	10.31
7/25	0.060	1.524	0.002162	1.3950	25.35	44.62	11.34	19.96	2.162	4.921
7/24	0.066	1.676	0.002620	1.7675	31.35	55.18	9.39	16.52	2.620	5.750
7/23	0.072	1.829	0.003114	2.0092	36.50	64.24	7.88	13.87	3.114	6.636
7/22	0.084	2.134	0.004258	2.7340	49.69	87.46	5.79	10.19	4.238	8.543
7/21½	0.090	2.286	0.004864	3.1381	57.03	100.4	5.04	8.87	4.864	9.565
7/21	0.096	2.438	0.005535	3.5710	64.89	114.2	4.43	7.80	5.535	10.65
7/20½	0.099	2.515	0.005869	3.7865	69.00	121.45	4.16	7.33	5.869	11.19
7/20	0.108	2.743	0.007005	4.495	82.13	144.87	3.50	6.16	7.005	12.90
7/19	0.120	3.048	0.008649	5.580	101.40	178.47	2.84	5.00	8.640	15.34
7/18	0.144	3.658	0.012460	8.038	146.00	257.0	1.97	3.47	12.46	20.68
7/17	0.168	4.267	0.016950	10.936	198.70	349.7	1.45	2.55	16.95	26.62
7/16	0.192	4.877	0.022140	14.284	259.50	450.7	1.11	1.95	22.14	33.12
7/15	0.216	5.486	0.02803	18.085	328	577	0.8750	1.54	28.03	40.22
7/14	0.240	6.096	0.03459	22.32	406	714	0.709	1.24	34.59	47.80
7/12	0.312	7.925	0.05845	37.71	686	1210	0.418	0.736	58.45	73.47
7/10	0.384	9.754	0.08855	57.13	1039	1833	0.274	0.486	88.55	103.3
19/22	0.140	3.556	0.01148	7.406	135	238	2.123	3.63	11.48	19.36
19/21	0.160	4.064	0.01500	9.678	176	311	1.625	2.85	15.00	24.09
19/20	0.180	4.572	0.01899	12.25	223	393	1.292	2.27	18.99	29.23
19/19	0.200	5.080	0.02343	15.12	276	486	1.046	1.84	23.43	34.74
19/18	0.240	6.096	0.03375	21.77	397	699	0.727	1.28	33.75	46.85
19/17	0.280	7.112	0.04593	29.64	540	950	0.534	0.940	45.93	60.33
19/16	0.320	8.128	0.06000	38.71	706	1243	0.409	0.720	60.00	75.06
19/15	0.360	9.144	0.07586	48.94	893	1572	0.313	0.550	75.86	91.12
19/14	0.400	10.16	0.09372	60.47	1103	1941	0.262	0.461	93.72	108.3
19/13	0.460	11.68	0.12385	79.90	1458	2566	0.198	0.335	123.85	136.2
19/12	0.520	13.21	0.15826	102.10	1864	3281	0.149	0.262	158.26	166.4
37/20	0.252	6.401	0.03700	23.8	435	766	0.665	1.169	37.00	50.47
37/18	0.336	8.534	0.0658	42.45	774	1363	0.374	0.656	65.8	80.9
37/16	0.448	11.38	0.1168	75.36	1375	2420	0.210	0.370	116.8	129.6
37/15	0.504	12.80	0.1478	95.35	1740	3062	0.166	0.292	147.8	157.3
37/14	0.560	14.22	0.1824	117.70	2148	3781	0.134	0.236	182.4	187.0
27/13	0.644	16.36	0.250	161.3	2842	5002	0.1016	0.1788	250	238
37/12	0.728	18.49	0.314	202.6	3634	6497	0.0796	0.1402	314	287
61/18	0.432	10.97	0.1104	71.41	1275	2246	0.2220	0.3905	110	122
61/16	0.576	14.63	0.1962	127.8	2269	3993	0.1250	0.2195	196	195
61/14	0.720	18.29	0.3065	197.8	3545	6240	0.0797	0.1405	306	281
91/14	0.880	22.35	0.4571	294.5	5280	9309	0.0536	0.0945	457	391
91/13	1.012	25.70	0.600	387.1	6854	12064	0.0421	0.0741	600	490
91/12	1.144	29.06	0.800	516.2	8933	15720	0.0323	0.0569	800	625

GILBERT'S TABLE (Ordinary Catenary).

 $x=100=\text{half span.}$

$c=\text{Modulus.}$	$d=\text{dip.}$	$s=\text{length of wire.}$	$l=\text{ordinate at insulator.}$	$90^\circ \rightarrow ^\circ.$		
				$^\circ$	$'$	$''$
2000	2'500511	100'041474	2002'500511	87	8	11
1950	2'564593	100'042440	1952'564593	87	3	46
1900	2'032163	100'045727	1902'632163	86	59	8
1850	2'703298	100'047540	1852'703298	86	54	13
1800	2'778421	100'050163	1802'778421	86	49	6
1750	2'857914	100'054318	1752'857914	86	43	40
1700	2'042018	100'057566	1702'942018	86	37	53
1650	3'031204	100'060788	1653'031204	86	31	46
1600	3'125974	100'064421	1603'125974	86	25	16
1550	3'226852	100'068245	1553'226852	86	18	21
1500	3'334558	100'073039	1503'334558	86	10	59
1450	3'449618	100'078929	1453'449618	86	3	6
1400	3'572907	100'084490	1403'572907	85	54	39
1350	3'705344	100'090750	1353'705344	85	45	35
1300	3'847958	100'097440	1303'847958	85	35	45
1250	4'002035	100'105463	1254'002035	85	25	16
1200	4'168981	100'114680	1204'168981	85	13	51
1150	4'350543	100'125801	1154'350543	85	1	26
1100	4'548545	100'137346	1104'548545	84	47	54
1050	4'765440	100'150553	1054'765440	84	33	5
1000	5'004084	100'165906	1005'004084	84	16	48
980	5'106408	100'173025	985'106408	84	9	49
960	5'213007	100'180582	965'213007	84	2	13
940	5'324098	100'188974	945'324098	83	54	58
920	5'440045	100'196101	925'440045	83	47	4
900	5'561266	100'205825	905'561266	83	38	48
880	5'687876	100'214837	885'687876	83	30	11
860	5'820479	100'225255	865'820479	83	21	9
840	5'959364	100'235949	845'959364	83	11	42
820	6'105033	100'247321	826'105038	83	1	47
800	6'258102	100'260296	806'258102	82	51	23
780	6'418938	100'273356	786'418938	82	40	28
760	6'588360	100'288153	766'588360	82	28	57
740	6'767004	100'304328	746'767004	82	16	50
720	6'955577	100'321527	726'955577	82	4	3
700	7'154926	100'339860	707'154926	81	50	33
680	7'366193	100'360765	687'366193	81	36	15
660	7'590181	100'382517	667'590181	81	21	6
640	7'828368	100'407143	647'828368	81	5	1
620	8'081923	100'433570	628'081923	80	47	54
600	8'352608	100'463404	608'352608	80	29	40
580	8'642033	100'495085	588'642033	80	10	11
560	8'952299	100'532176	568'952299	79	49	27
540	9'283888	100'562366	549'283888	79	27	2
520	9'615021	100'617335	529'645021	79	2	56
500	10'033315	100'667683	510'033315	78	36	59
480	10'454508	100'725490	490'454508	78	8	55
460	10'912412	100'789382	470'912412	77	38	28
440	11'412622	100'863052	451'412622	77	5	23
420	11'961025	100'947150	431'961025	76	29	6
400	12'565207	101'044792	412'565207	75	49	22
380	13'233994	101'158163	393'233994	75	5	35
360	13'978365	101'290757	373'978365	74	17	7
340	14'812141	101'447796	354'812141	73	32	10
320	15'752501	101'635337	335'752501	72	22	46
300	16'821529	101'862069	316'821529	71	14	44
280	18'047685	102'139232	298'047685	69	57	31
260	19'468993	102'483745	279'468993	68	29	13
240	21'126437	102'893226	261'126437	66	47	38
220	23'118850	103'473548	243'118850	64	48	38
200	25'525175	104'219022	225'525175	62	28	34
180	28'559946	105'343499	208'559946	59	39	43
160	32'280531	106'638654	192'280531	56	19	0
140	37'258541	108'722538	177'258541	52	10	2
120	44'134402	111'982596	164'134402	46	58	48
100	54'308027	117'520071	154'308027	40	23	42
95	57'674415	119'517684	152'674415	38	28	45
90	61'511583	121'884206	151'511583	36	26	34
85	65'852160	124'624934	150'852160	34	17	44
80	74'073875	128'153485	151'073875	31	58	28
75	77'147407	132'377616	152'147407	29	32	4
70	84'433443	137'657866	154'433443	26	57	10

TABLE.

The figures in this Table apply to situations where the maximum temperature of the air does not exceed 100° F. (37.7° C.). A margin in the maximum possible temperature of the cables has been allowed to provide for contingencies. The figures in columns 3, 3a, 4, and 4a have been supplied by the National Physical Laboratory to comply with Rule 36.

Gauge.	Section.	Rubber Insulated Cables.		Paper or Fibre Insulated Cables.		Minimum Insulation Resistance of one mile in megohms at 60° F.		Resistance.	Minimum Radial Thickness.			Gauge.		
Number of wires and gauge in S.W.G. or inches.	Nominal sectional area of conductors.	Volts drop. Approximate total length in circuit (lead and return) for 1-volt drop (Col. 3).		Volts drop. Approximate total length in circuit (lead and return) for 1-volt drop (Col. 4).		Vulcanised Rubber.		Conductor resistance in standard ohms per yards.	Vulcanised Rubber.	Paper or Fibre. (Class B.)	Lead Sheath.	Number of wires and gauge in S.W.G. or inches.		
		Current. Maximum current permissible.	Yards.	Current. Maximum current permissible.	Yards.	Up to 250 volts.	Up to 650 volts.							
1.	2.	3.*		4.*		5.	6.	7	8.	9.	10.	11.	12.	13.
	Sq. Inches.	Amperes.	Yards.	Amperes.	Yards.	Megohms.	Megohms.	Megohms.	Ohms.	Inches.	Inches.	Inches.	Inches.	Wires { 3/25 3/24 3/23 }
Fitting Wires.	0.0009	3.7	10	3.7	10	1,250	4,500	For resistance must not be less than 7/18. the insulation resistance must not be less than 140 megohms.	26.01	0.034	0.062	—	—	3/25
	0.0011	4.5	10	4.5	10	1,250	4,500		21.50	0.034	0.062	—	—	3/24
	0.0013	5.3	10	5.3	10	1,250	4,500		18.07	0.035	0.062	—	—	3/23
1/18	0.0018	7.2	10	0.2	10	2,000	5,000	For conductors smaller than 7/18. the insulation resistance must not be less than 140 megohms.	13.29	0.035	0.062	—	—	1/18
	0.0018	7.2	10	7.2	10	1,250	4,500		13.27	0.036	0.062	—	—	3/32
	0.0022	8.6	10	8.6	10	1,250	4,500		11.12	0.036	0.062	—	—	7/25
3/21	0.0024	9.5	10	9.5	10	1,250	4,500	For conductors smaller than 7/18. the insulation resistance must not be less than 140 megohms.	10.16	0.038	0.062	—	—	3/21
	0.0025	9.8	10	9.8	10	2,000	5,000		9.761	0.036	0.062	—	—	1/17
	0.0026	10.4	10	10.4	10	1,250	4,500		9.19	0.037	0.062	—	—	7/24
3/20	0.0030	12.0	10	12.0	10	1,250	4,500	For conductors smaller than 7/18. the insulation resistance must not be less than 140 megohms.	8.0	0.038	0.062	—	—	3/20
	0.0031	12.4	10	12.4	10	1,250	4,500		7.72	0.037	0.062	—	—	7/23
	0.0032	12.9	10	12.9	10	2,000	5,000		7.47	0.036	0.062	—	—	1/16
3/19	0.0037	14.8	10	14.8	10	1,250	4,500	For conductors smaller than 7/18. the insulation resistance must not be less than 140 megohms.	6.504	0.039	0.062	—	—	3/19
	0.0041	16.3	10	16.3	10	1,250	4,500		5.905	0.037	0.062	—	—	1/15
	0.0042	17.0	10	17.0	10	1,250	4,500		5.672	0.038	0.062	—	—	7/22
1/14	0.0050	19.0	10	20.1	10	1,250	4,500	For conductors smaller than 7/18. the insulation resistance must not be less than 140 megohms.	4.783	0.038	0.062	—	—	1/14
	0.0053	20.0	11	21.2	10	1,250	4,500		4.516	0.040	0.062	—	—	3/18
	0.0055	21.0	11	22.1	10	1,250	4,500		4.343	0.040	0.062	—	—	7/21
7/20	0.0070	24.0	12	28.0	10	900	4,000	For conductors smaller than 7/18. the insulation resistance must not be less than 140 megohms.	3.431	0.041	0.062	—	—	7/20
	0.0086	28.0	12	31.6	10	900	4,000		2.779	0.042	0.062	—	—	7/19
	0.0125	34.0	14	50.0	10	900	4,000		1.930	0.044	0.062	—	0.080	0.060	7/18

For conductors smaller than 7/18 the insulation resistance must not be less than 140 megohms.

7/17 19/20 7/16 19/19	0.017 0.019 0.022 0.023	40°0 43°0 46°0 47°0	17 18 19 19	67°0 69°0 75°0 76°0	10 11 11 12	900 750 900 750	4,000 3,500 3,500 3,500	140 140 140 140	1.418 1.266 1.086 1.0260	0.047 0.048 0.049 0.050	0.062 0.062 0.062 0.062	0.080 0.080 0.080 0.080	0.060 0.060 0.060 0.060	7/1 19/20 7/16 19/19
7/068" 7/15 7/18 7/14	0.025 0.028 0.034 0.035	50°0 53°0 59°0 60°0	20 21 23 23	81°0 86°0 96°0 97°0	12 12 13 13	750 750 750 750	3,500 3,500 3,000 3,500	140 140 120 120	0.9618 0.8578 0.7125 0.6949	0.050 0.052 0.054 0.054	0.062 0.062 0.062 0.062	0.080 0.080 0.080 0.080	0.060 0.060 0.060 0.060	7/068" 7/15 19/18 7/14
19/17 7/097" 19/058" 19/16	0.046 0.050 0.050 0.060	70°0 74°0 74°0 83°0	26 27 27 29	114°0 120°0 120°0 135°0	15 16 16 17	750 750 750 750	3,000 3,500 3,000 3,000	120 120 120 110	0.5234 0.4727 0.4880 0.4007	0.058 0.059 0.059 0.062	0.062 0.062 0.062 0.066	0.080 0.080 0.080 0.080	0.060 0.060 0.060 0.070	19/17 7/097" 19/058" 19/16
19/072" 19/14 19/083" 37/16	0.075 0.094 0.100 0.117	97°0 113°0 118°0 130°0	31 33 34 36	157°0 183°0 191°0 210°0	18 19 20 21	600 600 600 600	3,000 3,000 3,000 3,000	110 100 100 90	0.3167 0.2365 0.2383 0.2059	0.060 0.070 0.071 0.075	0.066 0.071 0.071 0.076	0.080 0.090 0.090 0.090	0.070 0.070 0.070 0.070	19/072" 19/14 19/083" 37/16
19/092" 37/072" 19/101" 37/14	0.125 0.150 0.150 0.182	134°0 152°0 152°0 172°0	37 39 39 42	219°0 246°0 246°0 275°0	21 23 23 24	600 600 600 600	3,000 3,000 3,000 2,500	90 90 90 90	0.1940 0.1627 0.1610 0.1318	0.076 0.080 0.081 0.086	0.076 0.080 0.080 0.087	0.090 0.090 0.090 0.090	0.070 0.080 0.080 0.080	19/092" 37/072" 19/101" 37/16
37/085" 37/092" 37/104" 37/112"	0.200 0.250 0.300 0.350	184°0 214°0 240°0 264°0	43 47 50 53	206°0 343°0 385°0 435°0	25 27 30 31	600 600 600 600	2,500 2,500 2,500 2,500	80 80 80 80	0.1224 0.0997 0.0780 0.0672	0.087 0.094 0.103 0.107	0.087 0.094 0.101 0.107	0.090 0.100 0.100 0.100	0.080 0.090 0.090 0.090	37/085" 37/092" 37/104" 37/112"
61/002" 61/007" 61/104" 61/108"	0.400 0.450 0.500 0.550	288°0 310°0 324°0 337°0	55 58 60 61	464°0 502°0 540°0 583°0	32 34 35 36	600 600 600 600	2,500 2,500 2,500 2,500	80 80 80 80	0.0605 0.0544 0.0473 0.0439	0.113 0.121 0.121 0.125	0.113 0.118 0.121 0.125	0.100 0.100 0.100 0.110	0.100 0.100 0.100 0.110	61/002" 61/007" 61/104" 61/108"
61/112" 61/118" 91/098" 91/101"	0.600 0.650 0.700 0.750	384°0 410°0 434°0 461°0	62 63 64 65	624°0 662°0 700°0 738°0	36 37 38 38	600 600 600 600	2,500 2,500 2,500 2,500	80 80 70 70	0.0408 0.0368 0.0357 0.0336	0.125 0.129 0.129 0.131	0.125 0.129 0.129 0.131	0.110 0.110 0.110 0.110	0.110 0.110 0.110 0.110	61/112" 61/118" 91/098" 91/101"
91/108" 91/112" 91/118" 127/101"	0.800 0.900 1.000 1.000	488°0 540°0 595°0 595°0	65 66 67 67	776°0 855°0 932°0 932°0	39 39 40 40	600 600 600 600	2,500 2,500 2,500 2,500	70 70 70 70	0.0294 0.0273 0.0246 0.0241	0.133 0.137 0.141 0.141	0.133 0.137 0.141 0.141	0.120 0.120 0.130 0.130	0.120 0.120 0.120 0.120	91/108" 91/112" 91/118" 127/101"

* N.B.—It must not be assumed that this current is always permissible, especially for lighting circuits where the determining factor is the drop in volts.

GILBERT'S TABLE.

NOTES ON THE USE OF THE TABLE AS GIVEN ON PAGE 1,051.

Let the distance between the points of support be 2,000 ft. Then x , the half-span, is 1,000 ft. In the table x is represented by 100; therefore every unit in the table represents 10 ft.

Let the required sag be 30 ft., or 3 units of dip. The nearest to this in column 2 is $d = 3.031$.

In column 5 we find that the angle which the catenary will make with the vertical through the point of support is $86^{\circ} 31' 46''$.

In column 3 we find that the actual length of the catenary will be 100.060788 units, or 1000.61 ft.

In column 1 we find that the modulus c is 1,650. This modulus multiplied by the weight per unit length gives the tension at the lowest (mid-) point.

Thus if the wire forming the catenary weighs 100 lbs. per 1,000 yards, or 1.30 lb. per foot, the weight per unit of the table is $\frac{1}{3}$ lb., and the tension at the lowest point will be $1,650 \times \frac{1}{3}$, or 550 lbs., due to weight of wire alone.

The tension at the point of suspension is found by adding to this mid-point tension the product of the sag in feet into the weight of wire per foot; that is, in this case, by adding 1 lb.

DATA FOR B-H CURVES (see page 1049).

AVERAGE FIRST QUALITY AMERICAN METAL.

(Sheldon.)

H	Ampere turns per cm. length.	Ampere turns per inch length.	Cast Iron.		Cast Steel.		Wrought Iron.		Sheet Metal.	
			B Kilo- gausses.	Kilomax- wells per sq. in.	B Kilo- gausses.	Kilomax- wells per sq. in.	B Kilo- gausses.	Kilomax- wells per sq. in.	B Kilo- gausses.	Kilomax- wells per sq. in.
10	7.95	.20.2	4.3	27.7	11.5	74.2	13.0	83.8	14.3	92.2
20	15.90	.40.4	5.7	36.8	13.8	89.0	14.7	94.8	15.6	100.7
30	23.85	.60.6	6.5	41.9	14.9	96.1	15.3	98.6	16.2	104.5
40	31.80	.80.8	7.1	45.8	15.5	100.0	15.7	101.2	16.6	107.1
50	39.75	1.01.0	7.6	49.0	16.0	103.2	16.0	103.2	16.9	109.0
60	47.70	1.21.2	8.0	51.6	16.5	106.5	16.3	105.2	17.3	111.6
70	55.65	1.41.4	8.4	53.2	16.9	109.0	16.5	106.5	17.5	112.9
80	63.65	1.61.6	8.7	56.1	17.2	111.0	16.7	107.8	17.7	114.1
90	71.60	1.81.8	9.0	58.0	17.4	112.2	16.9	109.0	18.0	116.1
100	79.50	2.02.0	9.4	60.6	17.7	114.1	17.2	110.9	18.2	117.3
150	119.25	3.03.0	10.6	68.3	18.5	119.2	18.0	116.1	19.0	122.7
200	159.0	4.04.0	11.7	75.5	19.2	123.9	18.7	120.8	19.6	126.5
250	198.8	5.05.0	12.4	80.0	19.7	127.1	19.2	123.9	20.2	130.2
300	238.5	6.06.0	13.2	85.1	20.1	129.6	19.7	127.1	20.7	133.5

$$H = 1.257 \text{ ampere turns per cm.} = .495 \text{ ampere turns per inch.}$$

WEIGHTS AND MEASURES

AVOIRDUPOIS WEIGHT.

drachms.	oz.	lbs.	qrs.	cwts.	ton.	grammes.
1	= .0625	= .0039	= .000139	= .000035	= .00000174	= 1.771846
16	= 1	= .0625	= .00223	= .000558	= .000028	= 28.34954
256	= 16	= 1	= .0357	= .00893	= .000447	= 453.59
7168	= 448	= 28	= 1	= .25	= .0125	= 12,700
28672	= 1792	= 112	= 4	= 1	= .05	= 50,802
573440	= 35840	= 2240	= 80	= 20	= 1	= 1,016,048

TROY WEIGHT.

grains.	dwts.	oz.	lb.	grammes.
1	= .04167	= .00208	= .0001736	= .0648
24	= 1	= .05	= .004167	= 1.555
480	= 20	= 1	= .0833	= 31.1035
5760	= 240	= 12	= 1	= 373.242
7000 grains troy = 1 lb. avoirdupois.				
175 lbs. troy = 144 lbs. avoirdupois.				
lbs. avoirdupois \times 1.2153 = lbs. troy.				
lbs. troy \times .82286 = lbs. avoirdupois.				

LONG MEASURE.

ins.	feet.	yards.	fath.	poles.	furl.	mile.	metres.
1	= .083	= .02778	= .0139	= .005	= .000126	= .0000158	= .0254
12	= 1	= .333	= .1667	= .0606	= .00151	= .0001894	= .3048
36	= 3	= 1	= .5	= .182	= .00454	= .000568	= .9144
72	= 6	= 2	= 1	= .364	= .0091	= .001136	= 1.8287
198	= 16½	= 5½	= 2½	= 1	= .025	= .003125	= 5.0291
7920	= 660	= 220	= 110	= 40	= 1	= .125	= 201.16
63360	= 5280	= 1760	= 880	= 320	= 8	= 1	= 1609.315

MEASURE OF CAPACITY

pints.	gall.	peck.	bushel.	quarter.	wey.	last.	cu. ft.	litres.
1	= .125	= .0625	= .01562	= .00781	= .00039	= .000195	= .02	= .5676
8	= 1	= .5	= .125	= .0625	= .00312	= .00156	= .1604	= 4.543
16	= 2	= 1	= .25	= .125	= .00625	= .00312	= .3208	= 9.082
64	= 8	= 4	= 1	= .125	= .025	= .0125	= 1.283	= 36.32816
512	= 64	= 32	= 8	= 1	= .2	= .1	= 10.264	= 290.625
2560	= 320	= 160	= 40	= 5	= 1	= .5	= 51.319	= 1453.126
5120	= 640	= 320	= 80	= 10	= 2	= 1	= 102.64	= 2906.25

1 gallon in wine, ale, or dry measure

= 277½ cubic inches = .16 cubic foot

= 10 lbs. of distilled water =

Cube feet \times 6.2355 = gallons.

Cube ins. \times .003607 = gallons.

1 bushel = 2218.19 cube inches = 1.28 cube foot.

Cube feet \times .78 = bushels.

Cube ins. \times .00045 = bushels.

SQUARE OR SURFACE MEASURE.

144 square inches = 1 square foot.

9 square feet = 1 square yard.

30¼ square yards = 1 square rod or perch.

40 square rods = 1 rood.

4 roods = 1 acre (4,840 square yards).

640 acres = 1 square mile (3,097,600 square yards).

METRIC SYSTEM OF WEIGHTS AND MEASURES.

The Metric System is based upon the estimated length of the fourth part of a terrestrial meridian. The ten-millionth part of this arc is called a *Metre*, and is the unit of length. The cube of the tenth part of the metre was adopted as the unit of capacity, and denominated a *Litre*. The weight of a litre of distilled water at its greatest density was called a *Kilogramme*, of which the thousandth part, or *Gramme*, was adopted as the unit of weight. The multiples of these, proceeding in decimal progression, are distinguished by the employment of the prefixes *deca*, *hecto*, *kilo*, and *myria*, and the subdivisions by *deci*, *centi*, and *milli*. The units in general use are as follows:—

MEASURES OF LENGTH (UNIT METRE).

Equal to	Metre.	Inches.	Feet.	Yards.	Miles.
Millimetre	0'001 ...	0'039 ...	0'003 ...	0'001 ...	0'000
Centimetre	0'010 ...	0'393 ...	0'032 ...	0'010 ...	0'000
Metre	1'000 ...	39'370 ...	3'280 ...	1'093 ...	0'000
Kilometre	1000'000 ...	39370'790 ...	3280'899 ...	1093'633 ...	0'621

CUBIC, OR MEASURES OF CAPACITY (UNIT LITRE).

Equal to	Cubic inches.	Cubic feet.	Pints.	Gallons.
Cubic Centimetre	0'061 ...	0'000 ...	0'001 ...	0'000
Litre, or cubic decimetre	61'027 ...	0'035 ...	1'760 ...	0'220
Cubic Metre	61027'051 ...	35'316 ...	1760'773 ...	220'096

MEASURES OF WEIGHT (UNIT GRAMME).

Equal to	Grains.	Avoirdupois lb.	Cwt.=112lb.	Tons=20 cwt
Milligramme	0'015 ...	0'000 ...	0'000 ...	0'0000
Gramme	15'432 ...	0'002 ...	0'000 ...	0'0000
Kilogramme	15432'348 ...	2'204 ...	0'019 ...	0'0009
Tonne=1,000 kilogs. ... ..	...	2204'000 ...	19'678 ...	0'9839

SQUARE, OR SURFACE MEASURE.

Equal to	Square feet.	Square yards.
Square Metre	10'7643 ...	1'196
Hectare=10,000 sq. met.=11,960 sq. yds.=2'47 acres.		

The Metric System of Weights and Measures, which, as plainly demonstrated in the preceding pages, is logically symmetrical, now forms the usual standard in the following countries:—

*Argentine Republic.	Egypt.	*Peru.
Austro-Hungary.	France.	Portugal.
Belgium.	German Empire.	†Roumania.
*Bolivia.	†Greece.	Servia.
*Brazil.	Holland.	*Spain.
*Chile.	Italy.	Sweden.
*Colombia.	*Mexico.	
Denmark.	Norway.	

The following countries have not adopted the Metric System:—

CANADA.—The legal Weights and Measures are the Imperial yard, Imperial pound avoirdupois, Imperial gallon, and the Imperial bushel. By Act 42 Vict., cap. 16, the British hundredweight of 112 pounds and the ton of 2,240 pounds were abolished, and the hundredweight was declared to be 100 pounds, and the ton 2,000 pounds avoirdupois as in United States, but sometimes contracts stipulate for the British weights.

CHINA.

Weights—10 Ch'ien ... = 1 Liang (Tael)=1'333 oz. avoirdupois or 37'78 grammes
 16 Liang ... = 1 Kin (Catty)=1'333 lbs. avoirdupois or 604'53 grammes.
 100 Chin ... = 1 Tan (Picul)=133'333 lbs. avoirdupois or 60'453 kilogrammes.
 4 ozs.=3 taels; 1 lb.= $\frac{3}{2}$ catty or 12 taels; 1 cwt.=84 catties; 1 ton=16 piculs 80 catties.

* Old Spanish measures also occasionally used are:—

Onza	= 1'014 ounce avoirdupois.
Libra	= 1'014 lb. avoirdupois.
Quintal	= 101'44 lb. avoirdupois.
Arroba (of 25 libras)	= 25'36 lb. avoirdupois.
Arroba of Wine	= 6'70 Imperial gallons.
Gallon	= .0'74 Imperial gallon.
Vara	= 0'927 yard.
Square Vara	= 0'859 square yard.

† Turkish measures are also in use:—

Oke of 410 drams	= 2'8283 lbs. avoirdupois.
Almud	= 1'151 Imperial gallons.
Kileh	= 0'9120 Imperial gallon.
44 okes = 1 Cantar	= 124'3616 lbs. avoirdupois.
39'6263 okes	= 1 cwt.
180 okes = 1 Tcheke	= 509'095 pounds.
1 kileh = 20 okes	= 0'36 Imperial quarter.
816 kilehs	= 100 Imperial quarters.

Capacity—10 Ko	...	...	= 1 Sheng (pint)=1·031 litre
10 Sheng	...	...	= 1 Tou (peck)=10·31 litre (holding from 6½ to 10 Kin of rice and measuring from 1·13 to 1·63 gallon)

Commodities, even liquids, such as oil, spirits, etc., are commonly bought and sold by weight.

Length—10 Fen	...	...	= 1 Ts'un (inch)
10 Ts'un	...	...	= 1 Chi'h (foot)=14·1 English inches by treaty
10 Chi'h	...	...	= 1 Chang=11 ft. 9 in. (141 in. by treaty)
1 Li	...	...	= ½ English mile (about)

The mow, the unit of measurement, is almost exactly one-sixth of an acre.

In the tariff settled by treaty between Great Britain and China, the Chi'h of $14\frac{1}{5}$ English inches has been adopted as the legal standard. The standards of weight and length vary all over the Empire, the Chi'h ranging from 9 to 16 English inches, and the Chang (=10 Chi'h) in proportion; at the treaty ports, the use of foreign treaty standard of Chi'h and Chang is common.

In October, 1907, a decree for uniform weights and measures was issued, making the K'up'ing or Treasury Scale the standard weight. The K'up'ing tael or ounce weighs 575·64 grains. The Haikwan tael weighs 581·47 grains.

INDIA.—The Maund of Bengal,

40 Seers	...	...	= 82 $\frac{2}{7}$ lbs. avoirdupois
The Maund of Madras	...	...	= 25 „ „ (nearly)
„ Tola	...	...	= 180 grains troy
„ Guz of Bengal	...	...	= 36 inches

An Act to provide for the adoption of an uniform system of weights and measures was passed in 1871. The Act orders: "Art. 2. The primary standard of weight shall be called a seer, and shall be a weight of metal in the possession of the Government of India, equal, when weighed in a vacuum, to the weight known in France as the kilogramme=2·205 lbs. avoirdupois." "Art. 3. The units of weight and measures of capacity shall be, for weights, the said seer; for measures of capacity, a measure containing one such seer of water at its maximum density, weighed in a vacuum. Unless it be otherwise ordered, the sub-divisions of all such weights and measures of capacity shall be expressed in decimal parts." This Act, however, has never been in operation.

JAPAN.—The Mommé =	2'11	drams or 2'41 dwts. or 120 mommé=1 lb. avoirdupois
The Kin (Catty)=160 mommé=	1'322	lb. avoirdupois (0'266 mommé=1 gramme) or 1'60 lbs. troy
„ Picul (100 kin) =	132'27	lbs.
„ Kwan=1,000 mommé... =	8'261	lbs. avoirdupois or 10'04 lbs. troy
„ Shaku =	994	foot (3'3 shaku=1 metre)
„ Kujira Shaku =	1'242	feet
„ Sün =	1'193	inches
„ Ken=6 Shaku =	5'965	feet
„ Jo=10 Shaku =	9'942	feet
„ Chô=60 Ken =	357'916	feet, or about $\frac{1}{15}$ mile
„ Ri=36 Chô =	2'44	miles
„ Ri (marine) =	1'15	mile
„ Ri (square) =	5'9552	square miles
„ Chô=10 tan =	2'45	acres
„ Koku, Liquid=10 To=100 Sho=39'7033		gallons
„ Koku, Dry =	4'9629	bushels
„ Koku (capacity of vessel) =	$\frac{1}{10}$	ton
„ To, Liquid =	3'9703	gallons
„ To, Dry =	1'9851	peck

RUSSIA.—1 Verst (500 sajènes)... =	3,500	feet, or two-thirds of a statute mile
1 Sajène (3 arshins)... .. =	7	feet
1 Arshin (16 vershok) =	28	inches
1 Square Verst =	0'43941	square mile
1 Dessiatine =	2'69972	acres
1 Pound (96 zolotniks=32 lot) =	$\frac{9}{16}$	of a pound or 14'4 ounces
1 Pood (40 pounds) =	36'113	lbs.=0'32244 cwt. or 100 poods = 1'6121 tons. * Baltic Freight is usually quoted per ton of 62 poods
1 Vedro (8 shtoffs) =	2 $\frac{3}{4}$	Imperial gallons
1 Chetvert (8 chetveriks) ... =	5'77	Imperial bushels or 46'2 gals.

UNITED STATES.—British weights and measures are usually employed, but the old Winchester gallon and bushel are used instead of the new or Imperial standards. Different States have a legal standard for bushels of certain articles, such as grain and potatoes, varying from 60 lbs. for wheat to 32 for oats.

Wine gallon =	0'83333	gallon
Ale gallon =	1'01695	„
Bushel =	0'9692	Imperial bushel

Instead of the British cwt. a cental of 100 lbs. is used. 1 ton=2,000 lbs., except coal, which is usually 2,240 lbs. wholesale.

NAUTICAL MEASURES

(From "Lloyd's Calendar," by permission of the Committee of Lloyd's.)

12 inches = 1 foot 6 feet = 1 fathom
 3 feet = 1 yard 3 nautical miles ... = 1 league

Sea or Nautical Mile=one-sixtieth of a degree of latitude, and varies from 6,046 ft. on the Equator to 6,092 ft. in lat. 60°.

Nautical Mile for speed trials, generally { 6,080 feet
 called the Admiralty Measured Mile ... { 1,151 statute miles
 1,853 metres

Cable's length=the tenth of a nautical mile; or approximately, 100 fathoms or 200 yards.

A Knot=a nautical mile an hour, is a measure of speed, but is not infrequently, though erroneously, used as synonymous with a nautical mile.

Length of European Measures of Distances compared with the Nautical Mile of 6,080 feet.

	Length in Nautical Miles.		Length in Nautical Miles.
Nautical Mile	1'000	German Ruthen	4'064
British Statute Land Mile	0'868	Italian Mile	1'000
Austrian Mile	4'094	Norwegian Mile	6'097
Danish Mile	4'064	Russian Verst	0'576
French Kilometre	0'539	Swedish Mile	5'769
German Geographical Mile	4'000		

DISTANCE OF HORIZON.

The distance of the horizon—i.e., the greatest distance at which the surface of the sea is visible varies somewhat with refraction in the atmosphere, but is, on clear days, approximately as below:—

Elevation		Elevation		Elevation	
Feet.	Miles.	Feet.	Miles.	Feet.	Miles.
5.....	2'96	50.....	9'35	500.....	29'58
10.....	4'18	100.....	13'23	1000	33'40
20.....	5'92	200.....	18'72	5280	96'18
		300.....	22'91		

LENGTH OF A DEGREE IN LATITUDE AND LONGITUDE

Lat. °	Degree of Longitude.		Degree of Latitude.		Lat. °	Degree of Longitude.		Degree of Latitude.	
	Stat. Miles.	Naut. Miles.	Stat. Miles.	Naut. Miles.		Stat. Miles.	Naut. Miles.	Stat. Miles.	Naut. Miles.
0	69·160	60·000	68·698	59·600	45	48·986	42·498	69·044	59·899
2	·119	59·964	·699	·601	47	47·251	40·993	·068	·920
4	68·992	·855	·702	·603	49	45·459	39·439	·092	·941
6	·783	·673	·706	·607	51	43·611	37·835	·116	·962
8	·491	·419	·712	·612	53	41·710	36·186	·140	·982
10	·116	·093	·719	·618	55	39·758	34·491	·162	60·002
12	67·659	58·697	·728	·625	57	37·756	32·755	·184	·022
14	·120	·229	·738	·634	59	35·707	30·979	·206	·041
16	66·499	57·690	·750	·645	61	33·615	29·164	·228	·059
18	65·797	·081	·764	·657	63	31·481	27·311	·248	·077
20	·015	56·404	·779	·669	65	29·308	25·425	·268	·094
22	64·154	55·657	·795	·683	67	27·100	23·509	·286	·110
24	63·216	54·843	·813	·699	69	24·857	21·564	·302	·124
26	62·201	53·962	·831	·715	71	22·582	19·593	·318	·137
28	61·110	·016	·850	·731	73	20·282	17·597	·333	·149
30	59·944	52·005	·870	·749	75	17·956	15·578	·345	·161
32	58·706	50·931	·892	·767	77	15·607	13·539	·357	·171
34	57·396	49·794	·914	·786	79	13·238	11·484	·367	·179
36	56·016	48·597	·936	·806	81	10·853	9·417	·375	·186
38	54·568	47·340	·959	·826	83	8·456	7·338	·381	·192
40	53·053	46·026	·983	·846	85	6·048	5·248	·387	·196
42	51·473	44·656	69·007	·866	87	3·632	3·151	·390	·199
44	49·830	43·231	·013	·888	89	1·211	1·050	·392	·201

SPECIFICATION OF THE BEAUFORT SCALE WITH PROBABLE EQUIVALENTS OF THE NUMBERS OF THE SCALE.

Beaufort Number.	Admiral Beaufort's General Description of Wind.	Description of Wind.	Mode of Estimating aboard Sailing Vessels.	Specification of Beaufort Scale.		Mean wind force in lb. per square ft. at standard density. ($P = 0.0105 P_s$).	Corresponding Pressure in Centibars (10 ⁴ dynes per cm. ²).	Equivalent velocity in miles per hour.*	Limits of Velocities, † :				Beaufort Number.
				For Coast Use, based on Observations made at Scilly, Yarmouth and Holyhead.	For Use on Land, based on Observations made at Land Stations.				Statute Miles per Hour.	Nautical Miles per Hour.	Metres per Second.	Feet per Second.	
0	Calm .. ..	.. .. .	.. .. .	Calm	Calm; smoke rises vertically.	0	0	0	Less than 1	Less than 1	Less than 0.3	Less than 2	0
1	Light air ..	.. .. .	.. .. .	Fishing smack * just has steerage way.	Direction of wind shown by smoke drift, but not by wind vanes.	.01	.000	2	1-3	1-3	0.3-1.5	2-5	1
2	Slight breeze	{ Light breeze	{ Sufficient wind for working ship.	Wind fills the sails of smacks, which then move at about 1-2 miles per hour.	Wind felt on face; leaves rustle; ordinary vane moved by wind.	.08	.004	5	4-7	4-6	1.6-3.3	6-11	2
3	Gentle breeze			Smacks begin to caven, and travel about 3-4 miles per hour.	Leaves and small twigs in constant motion; wind extends light flag.	.28	.013	10	8-12	7-10	3.4-5.4	12-18	3
4	Moderate breeze	{ Forces most advantageous for sailing with leading wind and all sail drawing.	{	Good working breeze; smacks carry all canvas, with good list.	Raises dust and loose paper; small branches are moved.	.67	.031	15	13-18	11-16	5.5-8.0	19-27	4
5	Fresh breeze			Smacks shorten sail.	Small trees in leaf begin to sway; crested wavelets form on inland waters.	1.31	.060	21	19-24	17-21	8.1-10.7	28-36	5

6	Strong breeze	Strong wind	Reduction of sail necessary with leading wind.	Smacks have double reef in main sail. Care required when fishing.	Large branches in motion; whistling heard in telegraph wires; umbrellas used with difficulty.	2'3	103	27	25-31	22-27	10'8-13'8	37-46	6
7	Moderate gale (High wind)†			Smacks remain in harbour, and those at sea lie to.	Whole trees in motion; inconvenience felt when walking against wind.	3'6	164	35	32-38	28-33	13'9-17'1	47-56	7
8	Fresh gale (Gale)†			All smacks make for harbour, if near.	Breaks twigs off trees; generally impedes progress.	5'4	245	42	39-46	34-40	17'2-20'7	57-68	8
9	Strong gale ..	Gale forces	Considerable reduction of sail necessary even with wind quartering.	.. .. .	Slight structural damage occurs (chimney pots and slates removed).	7'7	348	50	47-54	41-47	20'8-24'4	69-80	9
10	Whole gale ..		Close reefed sail running, or hove to under storm sail.	.. .. .	Seldom experienced inland; trees uprooted; considerable structural damage occurs.	10'5	478	59	55-63	48-55	24'5-28'4	81-93	10
11	Storm	Storm forces		.. .. .	Very rarely experienced; accompanied by widespread damage.	14'0	636	68	64-75	56-65	28'5-33'5	94-110	11
12	Hurricane ..	Hurricane	No sail can stand even when running	.. .. .	.. .. .	Above 17'0	826	Above 75	Above 75	Above 65	33'6 or above	Above 110	12

* The fishing smack in this column may be taken as representing a trawler of average type and trim. For larger or smaller boats and for special circumstances allowance must be made.

† It has recently been decided that for statistical purposes winds of force less than 8 shall not be counted as gales, and to avoid the ambiguity implied by the use of the term "moderate gale" for force 7 the Beaufort description has been modified for use in connection with the daily weather service by the substitution of the descriptions in italics for forces 7 and 8.

‡ For converting estimates on the Beaufort scale into miles per hour (anemometer factor, 2'2).

§ For finding the Beaufort number corresponding with a recorded velocity.

METEOROLOGICAL OFFICE.

SOUTH KENSINGTON, LONDON S.W.

January, 1914.

THERMOMETRICAL AND BAROMETRICAL TABLE.

THERMOMETERS.			BAROMETER.	
Réaumur.	Centigrade.	Fahrenheit.	Millim.	Inches.
80°	100°	212°	715	= 28·15
		WATER BOILS (when the bar. is at 30 inch = 760 mm.)	720	= 28·35
76	95	203	725	= 28·54
72	90	194	730	= 28·74
68	85	185	735	= 28·94
64	80	176	740	= 29·13
62·7	78·3	173	745	= 29·33
		Alcohol boils (when the bar. is at 30 inch = 760 mm.)	750	= 29·53
60	75	167	755	= 29·73
56	70	158	760	= 29·92
52	65	149	765	= 30·12
48	60	140	770	= 30·32
44	55	131	775	= 30·51
43	53	127	780	= 30·71
40	50	122	785	= 30·91
36	45	113	790	= 31·10
32	40	104		
30·2	37·8	100	Inches.	Millim.
29·3	36·7	98	31	= 787·4
28	35	95	30	= 762·0
24	30	86	29	= 736·6
20	25	77	28	= 711·2
19	24	76	27	= 685·8
16	20	68		
12	15	59	Intermediate heights, to be added to above.	
8	10	50		
4	5	41		
0	0	32		
— 4	— 5	23		
— 8	— 10	14	Millim.	Inches.
— 12	— 15	5	1	= ·039
— 14·4	— 18	0	2	= ·079
		ZERO (Fahrenheit).	3	= ·118
			4	= ·158
			5	= ·197
			Inches.	Millim.
			0·1	= 2·5
			0·2	= 5·1
			0·3	= 7·6
			0·4	= 10·1
			0·5	= 12·7
			0·6	= 15·2
			0·7	= 17·8
			0·8	= 20·3
			0·9	= 22·9

To reduce °F. to °C. subtract 32 and then multiply by 5/9.

To reduce °C. to °F. multiply by 9/5 and then add 32.

MEASURES OF TIME.

The earth's axial rotation is the phenomenon by which time is measured everywhere on the earth's surface. Experiment and observation show that, if we assume the earth to rotate uniformly, there are many other phenomena which are as accurately isochronous in their periodicity. That is to say, they pass again and again through all their phases in exactly the same interval of time as measured in terms of the earth's rotation. In the pendulum of a clock and the balance-wheel of a watch we have such isochronism very approximately realised. A little consideration will convince us that the measurement of time is really a comparison of periodic sequences. We cannot conceive any other mode of marking off time intervals than by some kind of motion of a periodic character. Our practical unit of time is essentially terrestrial.

SIDEREAL DAY.—The standard unit of time is the **SIDEREAL DAY**, being the period in which the earth turns once round on its axis. It is divided into sidereal hours, minutes, and seconds; but these measures of time are used by astronomers only.

MEAN SOLAR TIME.—A **SECOND** is the time of one swing of a pendulum adjusted so as to make 86,164.09 swings in a sidereal day. Seconds are usually subdivided decimally.

One **MEAN SOLAR DAY** = 24 hours = 1,440 minutes = 86,400 seconds = 1.00273791 sidereal day.

RELATION BETWEEN TIME AND LONGITUDE.—At any given instant the mean solar time at two stations differs by an amount proportional to their difference of longitude, the time at the eastern station being the earlier.

CORRESPONDING DIFFERENCES.

Longitude.	Time.	Longitude.	Time.
15"	1 second.	75°	5 hours.
1'	4 seconds.	90	6 "
15'	1 minute.	105	7 "
1°	4 minutes.	120	8 "
15°	1 hour.	135	9 "
30	2 hours.	150	10 "
45	3 "	165	11 "
60	4 "	180	12 "

To show the exact date of any event, the meridian at which the time is reckoned must be specified. One degree longitude at Equator = 60 nauts = 69.17 statute miles.

STANDARD, OR ZONE TIME.

Country.	Central Meridian.	Fast or Slow on Greenwich Time.*
Western Europe, Algeria	0°	Greenwich Time.
Central Europe, Tunis, Congo, Angola, German South-West Africa	15° E.	1 h. fast
Eastern Europe, British South Africa, Egypt, Portuguese East Africa	30° E.	2 h. fast
Mauritius, Reunion and Seychelles	60° E.	4 h. fast
India (except Calcutta) and Ceylon	82½° E.	5½ h. fast
Calcutta	90° E.	6 h. fast
Burmah	97½° E.	6½ h. fast
Federated Malay States, Straits Settlements, and French Indo-China	105° E.	7 h. fast
Java	109° 48' 37.5" E.	7 h. 19 m. 14.5s. fast
Western Australia, Hong Kong, East Coast of China, Kiau Chau, Philippine Islands, British North Borneo, Labuan	120° E.	8 h. fast
Korea	127° 30' E.	8½ h. fast
Japan, Seoul, and Chemulpo	135° E.	9 h. fast
South Australia and Guam	142° 30' E.	9½ h. fast
New South Wales, Queensland, Tasmania, Victoria, New Guinea, and Caroline Island	150° E.	10 h. fast
New Zealand	172½° E.	11½ h. fast
Ascension	14° 15' W.	57 m. slow
Iceland, Madeira, Liberia and Portuguese Guinea	15° W.	1 h. slow
America :		
Atlantic (New Brunswick, Nova Scotia, Prince Edward Island, Grenada, Trinidad, etc.	60° W.	4 h. slow
Eastern (Eastern U.S., Chili, Panama, Peru, etc.)	75° W.	5 h. slow
Central	90° W.	6 h. slow
Mountain	105° W.	7 h. slow
Pacific (British Columbia, etc.)	120° W.	8 h. slow
Alaska	135° W.	9 h. slow
Hawaii or Sandwich Islands	157° 30' W.	10½ h. slow
Samoa	172½° W.	11½ h. slow

*Greenwich time is used in France, Spain, Portugal, Belgium, Gibraltar and the Faroes.

BELL TIME ON BOARD SHIP.

The nautical day begins at noon and is divided into "watches" of four hours each, time being indicated by bells striking every half hour.

A.M.	A.M.	A.M.		P.M.	P.M.	P.M.
12.30	4.30	8.30.....1	BELL	12.30	4.30	8.30
1.00	5.00	9.00.....2	BELLS.....	1.00	5.00	9.00
1.30	5.30	9.30.....3	BELLS.....	1.30	5.30	9.30
2.00	6.00	10.00.....4	BELLS.....	2.00	6.00	10.00
2.30	6.30	10.30.....5	BELLS.....	2.30	6.30	10.30
3.00	7.00	11.00.....6	BELLS.....	3.00	7.00	11.00
3.30	7.30	11.30.....7	BELLS.....	3.30	7.30	11.30
4.00	8.00	NOON.....8	BELLS.....	4.00	8.00	MIDNIGHT.

One of these four-hour watches is divided into two "dog watches":—

- (1) From 4 to 6 p.m.
- (2) From 6 to 8 p.m.

The hours for the "dog watches" are:—

4 BELLS	6.00 p.m.
1 BELL	6.30 p.m.
2 BELLS	7.00 p.m.
3 BELLS	7.30 p.m.

CONCISE TABLES OF CONTINENTAL MONEYS.

(Extracted by permission from Bradshaw's Continental Guide.)

(1) A CONCISE TABLE OF FOREIGN MONIES, REDUCED FROM ENGLISH INTO THE CURRENCY OF OTHER COUNTRIES AT PAR.

England.	France, Italy, Belgium, Switzerland.	Germany.	Holland.	United States.	Austria in Notes.	Russia in Notes.
£ s. d.	Frs. Cts.	Mks. Pfg.	Fl. Cts.	Dols. Cts.	Kronen.	Roubles.
0 0 0½	0 052	0 04	0 02	0 01	·04	·01
0 0 1	0 104	0 08	0 05	0 02	·08	·03
0 0 2	0 208	0 17	0 10	0 04	·18	·07
0 0 3	0 312	0 25	0 15	0 06	·26	·10
0 0 4	0 416	0 33	0 20	0 08	·38	·14
0 0 5	0 520	0 42	0 25	0 10	·48	·18
0 0 6	0 625	0 50	0 30	0 12	·56	·21
0 0 7	0 729	0 58	0 35	0 14	·66	·25
0 0 8	0 833	0 67	0 40	0 16	·76	·28
0 0 9	0 937	0 75	0 45	0 18	·86	·32
0 0 10	1 040	0 84	0 50	0 20	·96	·36
0 0 11	1 144	0 92	0 55	0 23	1·04	·39
0 1 0	1 25	1 0	0 60	0 25	1·20	·47
0 2 0	2 50	2 0	1 20	0 50	2·40	·95
0 3 0	3 75	3 0	1 80	0 75	3·60	1·42
0 4 0	5 0	4 0	2 40	1 0	4·80	1·90
0 5 0	6 25	5 0	3 0	1 25	6·	2·37
0 6 0	7 50	6 0	3 60	1 50	7·20	2·85
0 7 0	8 75	7 0	4 20	1 75	8·40	3·32
0 8 0	10 0	8 0	4 80	2 0	9·60	3·80
0 9 0	11 25	9 0	5 40	2 25	10·80	4·27
0 10 0	12 50	10 0	6 0	2 50	12·	4·75
0 11 0	13 75	11 0	6 60	2 75	13·20	5·22
0 12 0	15 0	12 0	7 20	3 0	14·40	5·70
0 13 0	16 25	13 0	7 80	3 25	15·60	6·17
0 14 0	17 50	14 0	8 40	3 50	16·80	6·65
0 15 0	18 75	15 0	9 0	3 75	18·	7·12
0 16 0	20 0	16 0	9 60	4 0	19·20	7·60
0 17 0	21 25	17 0	10 20	4 25	20·40	8·07
0 18 0	22 50	18 0	10 80	4 50	21·60	8·55
0 19 0	23 75	19 0	11 40	4 75	22·80	9·02
1 0 0	25 0	20 0	12 0	5 0	24·	9·40
2 0 0	50 0	40 0	24 0	10 0	48·	18·80
3 0 0	75 0	60 0	36 0	15 0	72·	28·20
4 0 0	100 0	80 0	48 0	20 0	96·	37·60
5 0 0	125 0	100 0	60 0	25 0	120·	47·
6 0 0	150 0	120 0	72 0	30 0	144·	56·40
7 0 0	175 0	140 0	84 0	35 0	168·	65·80
8 0 0	200 0	160 0	96 0	40 0	192·	75·20
9 0 0	225 0	180 0	108 0	45 0	216·	84·60
10 0 0	250 0	200 0	120 0	50 0	240·	94·

FOREIGN AND COLONIAL MONEYS WITH APPROXIMATE
VALUE IN BRITISH CURRENCY IN TIMES OF PEACE.

ARGENTINE REPUBLIC.—Gold coin, 5 dollars. Silver coins, 1 dollar and 50, 20, and 10 centavos. Bronze coins, 2 and 1 centavos. Nickel coins, 20, 10, and 5 centavos. Silver dollar or peso=4s. Money in circulation is chiefly paper, being converted at 44 cents gold to dollar=1s. 9d. Gold dollar=4s.

AUSTRALIA.—The same as in Great Britain.

AUSTRIA-HUNGARY.—Gold coins, 100 krone=£4 3s. 4d.; 20 krone=16s. 8d.; 10 krone=8s. 4d.; Single ducat=11 crowns 29 heller=9s. 4 $\frac{3}{4}$ d. Silver coin, 1 krone=100 heller=half gulden old coinage=10d. Exchange about 24 krone to £. Silver gulden or florins (about 12=£)=100 kreutzer continue to be legal tender. Nickel, 20 heller=10 kreutzer of old coinage=2d., 10 heller=5 kreutzer of old coinage=1d. Bronze, 2 heller=1 kreutzer= $\frac{1}{6}$ d., 1 heller= $\frac{1}{2}$ kreutzer= $\frac{1}{10}$ d.

BELGIUM.—The same as France.

BOLIVIA.—100 centavos=1 boliviano (paper)=about 1s. 7d., or 12 $\frac{1}{2}$ bolivianos to £. Coins in circulation are—silver, 50, 30, 20, and 10 centavos; nickel, 10 and 5 centavos, and English gold coin. Currency principally paper.

BRAZIL.—Currency paper, worth 1s. 4 $\frac{1}{2}$ d. per milreis (1,000 reis) or nearly 15 milrei=£1. Silver coinage of 2, 1, and $\frac{1}{2}$ milreis pieces in circulation.

BRITISH HONDURAS.—100 centavos=1 dollar (gold)=4s. 1 $\frac{1}{2}$ d. British sovereign (= \$4.86) and half sovereign, and U.S. gold coins legal. Silver coins—5, 10, 25 and 50 cents legal tender to \$10. Bronze—1 cent legal tender to 50 cents.

BULGARIA.—Lev (= franc) = 100 stotinki=9 $\frac{1}{2}$ d. (stotinka=centime). Gold coins, 10 and 20 leva, but foreign 10 and 20 franc pieces principally in circulation. Silver, $\frac{1}{2}$, 1, 2 and 5 leva. Nickel, 2 $\frac{1}{2}$, 5, 10, 20 stotinki. Bronze, 1, 2, 5, 10 stotinki.

CANADA.—1 cent= $\frac{1}{2}$ d. 100 cents=1 dollar=about 4s. 1 $\frac{1}{2}$ d. 4 dollars 86 $\frac{3}{4}$ cents=£ sterling. U.S. gold coins also legal.

CHILI.—Gold coins, 20 (colon or condor), 10 (doubloon), and 5 (escudo) peso pieces. Silver coins, 1 peso and $\frac{1}{5}$, $\frac{1}{10}$, and $\frac{1}{2}$ of a peso. Bronze coins, $\frac{1}{2}$, 1, 2 and $2\frac{1}{2}$ centavo pieces. Currency is paper—the peso or dollar=about 10d. The restoration of the gold currency is projected under a currency law which was to take effect in 1910, but has been since deferred. Gold peso=1s. 6d. English sovereign has a legal value of $13\frac{1}{8}$ pesos gold.

CHINA.—1,220 (about) cash=1 haikwan (or customs) tael=about 2s. $8\frac{1}{4}$ d. About 35 cash=1d. A coin recently issued is the “hundredth of a dollar” worth about $\frac{3}{25}$ of 1d. Silver dollar of same value as Japanese silver yen, is also current. At Hong Kong the dollar (1,000 cash)=about 1s. 11d. and at Shanghai about 2s. 8d. In October, 1908, an Imperial Edict decreed the establishment of a uniform Tael currency—unit silver tael to have a value of between 30d. and 40d.

COCHIN CHINA.—5 sapèques or cash=1 cent; 100 cents=1 dollar=about 2s.

COLOMBIA.—100 centavos=1 peso or dollar gold—nominal value 4s. Gold coins, 1, $2\frac{1}{2}$ and 5 dollars. Silver coins, real, peseta, half-dollar and dollar. Very few coins are in circulation, the currency being principally paper, subject to considerable fluctuation. At the legal rate the paper peso=1 centavo gold, or \$500=£1.

DENMARK.—100 ore=1 krone=1s. $1\frac{1}{4}$ d. 18 kroner 19 ore=£ sterling. Gold coins of 20 kroners and 10 kroners. Silver, 2 kroner (rigsdaler), 1 krone and 25 ore.

EGYPT.—97 $\frac{1}{4}$ piastres=£ sterling. 100 piastres, or 1,000 millimes=£ Egyptian (gold)=£1 os. $6\frac{1}{4}$ d. Gold circulating is almost exclusively English. 10 millimes=1 piastre=about $2\frac{1}{2}$ d. Gold piece of 20 francs=about 77 piastres. Silver coins, 1, 2, 5, 10 and 20 piastres; legal tender to £E2.

ERITREA.—1 tallero=5 Italian lire. Silver coins, 1, 2, 5 talleros.

FRANCE.—100 centimes=1 franc=9 $\frac{1}{2}$ d. 20 franc piece (Louis or Napoleon)=15s. 10d. About 25 francs 25 centimes=£ sterling. Gold coins of 5, 10, 20, 50, and 100 francs. Silver coins, 20 centimes, $\frac{1}{2}$, 1, 2, and 5 franc pieces. Nickel coin, 25 centimes. Bronze coins, 1, 2, 5, and 10 centimes.

GERMAN EMPIRE.—100 pfennig=1 mark=about 1s. About 20·45 m.=£ sterling. Gold coins, 20 (doppel-krone), 10 (krone), and 5 (half-krone) marks. Silver coins, 1, 2, 3, and 5 marks and 50 pfennige. Thaler=3 marks=2s. 11d. Nickel coins, 20, 10, and 5 pfennige. Bronze coins, 1 and 2 pfennige.

GREECE.—100 lepta=1 drachma paper=9d. 27 drachmæ 30 lepta=£1 or about 108 drachmæ per 100 fcs. Foreign gold coins in circulation.

HOLLAND.—100 cents=1 guilder or florin=1s. 8d. 12 guilders 10 cents=£ sterling. Gold coins, 10 florins (16s.). Silver coins, 2½ guilders (rijksdaaler), 1 guilder, ½ guilder and 25 cents.

INDIA.—£1=15 rupees. 16 annas=1 rupee=1s. 4d. 3 pie=1 pice, 12 pie=1 anna=1d. Lac of rupees=100,000. Crore of rupees=10,000,000.

ITALY.—100 centesimi=1 lira=9½d. About 25 lire 40 centesimi=£1 sterling. Gold coins, 100, 50, 20, and 10 lire. Silver coins, 5, 2, and 1 lira. Nickel coin, 20 centesimi. Bronze coins, 1, 2, 5, and 10 centesimi.

ITALIAN SOMALILAND.—Rupia, value L. It. 1·68 (=£1½ ster.). Silver coins, 1 rupia, ½ rupia, ¼ rupia. Bronze coins, 1 besa (value L. It. 0·0168), 2 besas, 4 besas. 1 rupia is equal to 100 besas.

JAPAN.—10 rin=1 sen=¼d., 100 sen=1 yen or dollar=2s. 0½d. Gold coins, 5, 10, and 20 yen. Silver coins, 10, 20, and 50 sen. Nickel coin, 5 sen. Bronze coins, 1 sen and 5 rin. The unit of account is the gold yen.

LYBIA.—The same currency as in Italy.

MEXICO.—100 centavos=1 dollar or peso (silver)=2s. 0½d.

NORWAY.—100 ore=1 kroner=1s. 1½d. Gold coins, 10 and 20 kroners. Exchange 18·19 krone=£ sterling. Paper money principally used; least value, 5 kroner. Below this amount, silver and copper coins.

PORTUGAL.—100 reis=1 teston=4d. 1,000 reis=1 milreis. Paper milreis=about 4s. 1d. Gold coins, 1, 2, 5, and 10 milreis. Currency, principally paper. Conto=1,000 milreis. In the Azores, 1 milrei=3s. 6½d.

ROUMANIA.—1 leu=100 bani=about 9½d. Gold coins, 5, 10, and 20 lei. Silver, 1 leu, 2 and 5 lei. Nickel, 5, 10 and 20 bani.

RUSSIA.—100 copecks = 1 rouble. Silver or paper rouble = 2s. $1\frac{1}{2}$ d.
Gold coins—15 roubles (imperial), 10 roubles, 7·50 roubles (half-imperial), 5 roubles. 15 paper roubles = 10 roubles gold = roughly 1 guinea. Currency principally paper.

SERVIA.—Dinar = 1 franc = $9\frac{1}{2}$ d. Gold coins, 10 and 20 dinars.
Silver, $\frac{1}{2}$, 1, 2, 5 dinars. Bronze, 5 and 10 paras. Nickel, 5, 10, 20 paras.

SPAIN.—100 centimos = 1 peseta—about 26·70 pesetas to the £ sterling. Gold coins are 20, 10 and 5 peseta pieces. Silver coins, 1 and 5 pesetas.

STRAITS SETTLEMENT AND MALAY STATES.—Gold dollar = 2s. 4d.
Silver coins—50, 20, 10 and 5 cent pieces—are legal tender to 2 dollars, but $\frac{1}{2}$ dollar is unlimited tender. Copper coins—1, $\frac{1}{2}$ and $\frac{1}{4}$ cents—are legal tender to 1 dollar.

SWEDEN.—Krona of 100 ore = 1s. $1\frac{1}{4}$ d. or 18·19 kr. to the £1.
Gold little used. Currency for 5 kr. or more mostly paper.

TURKEY.—40 paras = 1 piastre = $2\frac{1}{4}$ d. nearly. 100 piastres = 1 lira turca or gold medjidie = 18s. $109\frac{1}{2}$ pias = £1. "Purse," sometimes used in accounts = 500 piastres or 5 liras and is calculated = £4 10s. od. Value of piastre varies in different parts of the Turkish Dominions. In Syria, 1 Turkish £ = 130 local piastres and £1 = $143\frac{1}{2}$ local piastres.

UNITED STATES.—1 cent = about $\frac{1}{2}$ d., 100 cents = 1 dollar = 4s. $1\frac{1}{2}$ d.
4 dols. 87 cents = £ sterling. Gold coins, $2\frac{1}{2}$ dollar piece, half eagle (5 dollars), 1 eagle (10 dollars), 1 double eagle (20 dollars).

URUGUAY.—100 centavos = 1 dollar (gold) = about 4s. 3d., or \$4·70 = £. Only foreign gold coins (which are legal tender) are in circulation. Silver coins, 10, 20 and 50 cents and 1 dollar. Nickel, 1, 2 and 5 cents.

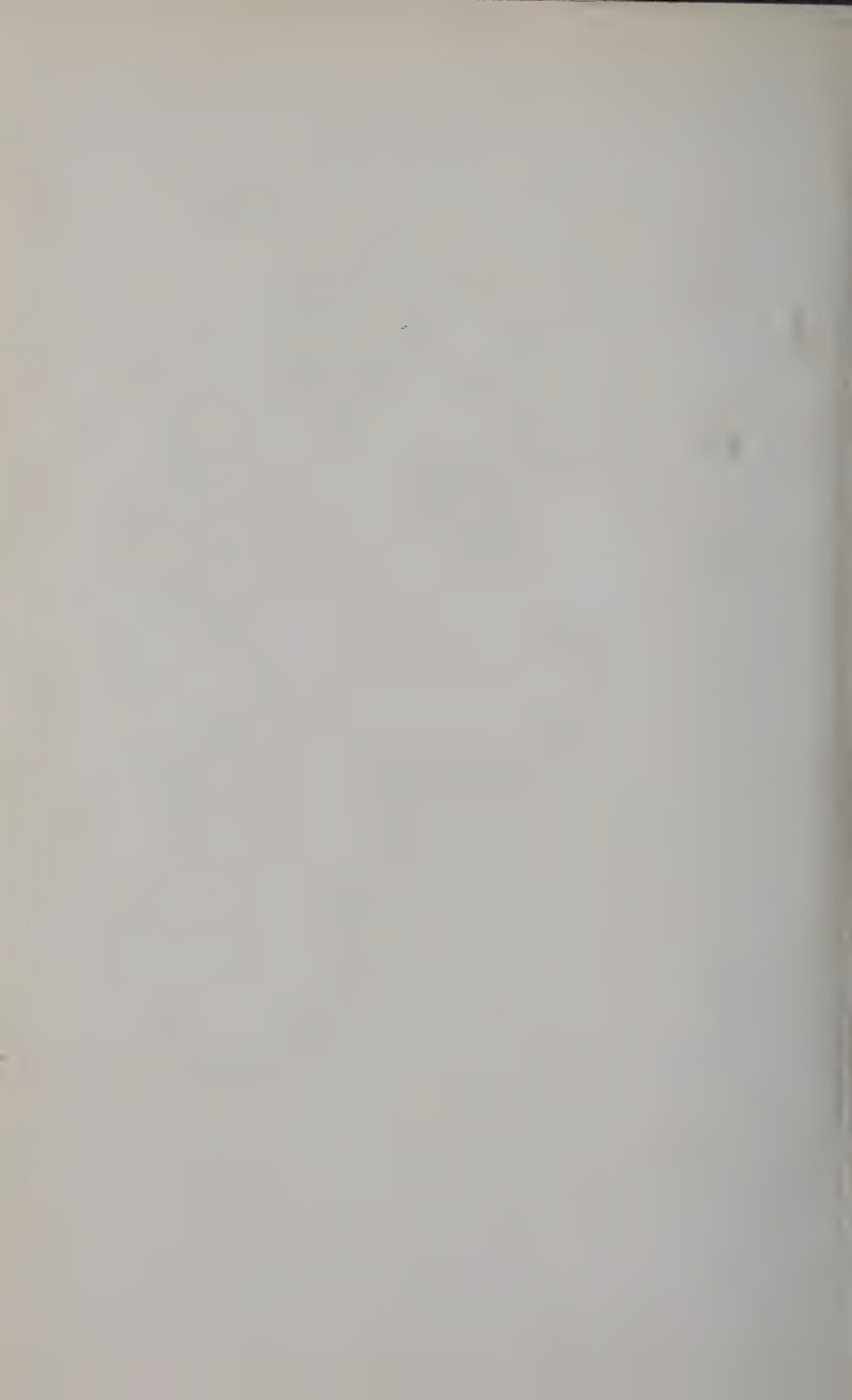
VENEZUELA.—Medio = about $2\frac{1}{2}$ d.; real = about 5d. Monetary unit is silver bolivar = about $9\frac{1}{2}$ d., or 1 franc, or 25·25 bols. to the £. Exchange fluctuates slightly from the par, but 25·25 bols. to the £ should be taken as a basis. Currency is based on gold standard—no paper in circulation. Coins are gold, silver and nickel, but principal coin is silver dollar of 5 bols. known as "peso fuerte" or simply "fuerte."



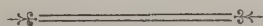
SÑR. DON GUILLERMO DESTRUGE, DIRECTOR-GENERAL OF
POSTS AND TELEGRAPHS, REPUBLIC OF ECUADOR.

(For biographical details, see page 1091.)

[To face page 1072.]



PARTICULARS OF THE LEADING COMPANIES ENGAGED IN THE COMMERCIAL DEVELOPMENT OF WIRELESS TELEGRAPHY



Amalgamated Wireless (Australasia) Limited

Incorporated.—July 11th, 1913, in the State of New South Wales.

Head Office.—"Wireless House," 97, Clarence Street, Sydney.

New Zealand Office.—"Australasia Chambers," Customs House Quay, Wellington, N.Z.

Directors.—Sir Thomas Hughes, M.L.C. (Chairman), C. P. Bartholomew, Esq., Alfred Goninan, Esq., James Taylor, Esq., F.C.P.A., Ernest T. Fisk, Esq.

Managing Director.—Ernest T. Fisk.

Deputy Manager.—W. H. Payne (Captain, A.I.F., on active service).

Acting Secretary.—J. F. Wilson.

Accountant.—F. W. Larkins, A.I.I.A.

ENGINEERING DEPARTMENT.

Technical Superintendent.—G. Apperley.

MARINE DEPARTMENT.

Traffic Superintendent.—L. L. Meredith.

Equipment Superintendent.—D. Campbell.

COMMERCIAL DEPARTMENT.

S. Stacey.

NEW ZEALAND BRANCH.

New Zealand Superintendent.—J. L. Mulholland.

Capital.—£140,000 in 140,000 shares of £1 each. Issued 140,000 of £1 each, all fully paid up. Financial year of the Company ends at June 30th. The annual general meeting is held in August.

The Company owns the sole and perpetual licence to use and exploit all Marconi Patents, also all Patents for the Poulsen Pedersen and Quenched Singing Spark Systems in the Commonwealth of Australia, in the Dominion of New Zealand, and in that part of the Pacific and Indian Oceans bounded by the 20 degrees north and 60 degrees south latitude and 110 degrees west and 110 degrees east longitude.

It has a large organisation for manufacturing wireless telegraph apparatus, erection and operation of stations, and the system is installed on close upon 200 passenger and cargo ships.

The Company also holds exclusive agencies for a number of important applications in electricity.

Accounts.—The accounts are made up to June 30th and December 31st in each year. The profit and loss accounts for the twelve months

ended June 30th, 1917, shows that the gross profit from trading account, radio-telegraphic traffic, ships' subsidies, etc., amounted to £30,069 4s. 6d., and after deducting all expenses (including depreciation amounting to £22,616 14s.), there was a net profit of £7,453 10s. 6d., from which a dividend of 5 per cent. was paid for the year.

Reserve accounts at June 30th, 1917, stood at £20,547 6s. 5d. Dividends, 1913-14, 4 per cent.; 1914-15, 6 per cent.; 1915-16, 5 per cent.; 1916-17, 5 per cent.

Compagnie Française Maritime et Coloniale de Télégraphie Sans Fil

Incorporated.—April 24th, 1903.

Head Office.—35, Boulevard des Capucines, Paris, France.

Directors.—Baron de la Chevrelère, Senatore G. Marconi, Alfred Musnier, John Dal Piaz, Charles Roux.

Secretary.—F. Gondry.

Engineer.—M. Tauléra.

Capital.—Authorised, 500,000 francs in 5,000 shares of 100 francs each. Issued, 300,000 francs in 3,000 shares of 100 francs, of which 1,000 are fully paid, whilst with regard to the other 2,000 shares there is a further liability of 50 francs per share. Besides these there are 200 Profit shares having no capital denomination. In January, 1916, the Directors decided to issue 2,000 shares of 100 francs each at 150 francs per share. The financial year of the Company ends at December 31st in each year. Dividends at the rate of 5 per cent. per annum have been paid on the capital shares of the Company in respect of each of the years 1906, 1907, 1908, 1909, 1910, and 1911, and 10 per cent. for the years 1912, 1913, 1914, and 1915. The dividends paid for the year 1916 were 12.50 francs on the old shares, 10 francs on the new shares, and 140.625 francs on the founders' shares. The founders' shares received for each of the years 1912, 1913, 1914, and 1915 a dividend of 31.25 francs per share. The Company owns and operates the wireless telegraph apparatus on over 140 vessels.

The Company holds the exclusive licence of Marconi's Wireless Telegraph Company, Limited, and the Marconi International Marine Communication Company, Limited, for France, its colonies and dependencies, and vessels flying the French flag.

Compagnie Générale de Radiotélégraphie, Société Anonyme

Incorporated.—January 15th, 1914.

Head Office.—63, Boulevard Haussmann, Paris.

Directors.—M. d'Arsonval, Membre de l'Institut de France (Président); MM. Gabion and Bitterli.

Manager.—M. L. Tronchon.

Technical Director.—M. G-E. Petit.

Chief Engineer.—M. G. Marie.

Capital.—1,500,000 francs, divided into 3,000 shares of 500 francs each, all issued and paid up.

Dividends.—Paid 6 per cent. for 1914 and 1915.

This Company purchased the assets of the Cie. Gle. Radio-télégraphique, incorporated in the year 1908. The Company owns and operates the patents Rochefort, Gaiffe, Colin, Jeance, Joly and C.G.R.

The Company owns and operates the wireless telegraph apparatus on more than 120 vessels of the French mercantile fleet, has furnished more than 500 stations to the French War-Marine, about 100 land stations all over the world, and more than 1,600 military portable sets.

Compagnie Générale de Télégraphie Sans Fil

Incorporated.—February 5th, 1918.

Head Office.—20 bis rue La Boetie, Paris.

Directors.—H. Bousquet (President), Baron de la Chevrelière (Vice-President), A. L. Atthalin, M. Bloch, A. Dupont, Godfrey C. Isaacs, E. May, N. Pietri.

Manager.—Ernest Sins.

Secretary.—Georges Tharel.

Capital.—12,500,000 francs, divided into 25,000 shares of 500 francs each, subscribed and fully paid; 32,000 parts bénéficiaires have also been issued. The financial year ends December 31st in each year.

The Company has acquired the greater part of the assets of La Compagnie Universelle de Télégraphie et de Téléphonie Sans Fil.

Compañía Marconi de Telegrafía Sin Hilos del Río de La Plata

Incorporated.—August 4th, 1906.

Head Office.—Tornquist Building, 132, San Martin, Buenos Aires, Argentine.

Directors.—Captain Guillermo José Nunes (President), Señor Florence O'Driscoll (Managing Director), Colonel Sir Thomas Holdich, K.C.M.G., K.C.I.E., C.B., Godfrey C. Isaacs, Senator G. Marconi, Señor J. A. Pilling, Señor Carlos Pereira Pinto, Señor Enrique Schlieper, Sydney St. J. Steadman, Señor Antonio Terrarosa.

Secretary.—Señor Enrique Schlieper.

Engineer.—E. Berry.

Capital.—\$2,000,000 gold, represented by 250,000 shares of \$5 gold each, series "AA," fully paid, and 150,000 Preference shares (5 per cent. non-cumulative) of \$5 gold each, series "BB," 35 per cent. has been called up on the "BB" shares. The balance is payable in instalments of 10 per cent. with not less than thirty days' notice. The financial year of the Company ends on May 31st.

The Company owns the Marconi patents and patent rights for the Argentine Republic, and has licences from Marconi's Wireless Telegraph Company, Limited, and the Marconi International Marine Communication Company, Limited, to work the Marconi system in the Republics of Argentine, Uruguay, and Paraguay. The Company has

the permission of the Government to erect wireless telegraph stations within the territorial limits of the Argentine Republic and on vessels flying the Argentine flag. The Company is constructing a high-power wireless station in the Argentine Republic to communicate direct with a similar station in Europe, and the Argentine Government approved this project on August 10th, 1912.

Compañía Nacional de Telegrafia Sin Hilos

Incorporated.—December 24th, 1910.

Head Office.—Calle de Alcalá 43, Madrid.

Directors.—Excmo. Sr. General Don José de Bascaran; Excmo. Sr. Senatore G. Marconi; Godfrey C. Isaacs; Excmo. Sr. Don Antonio Comyn, Conde de Albiz; Excmo. Sr. Don José Sanchez Guerra; Sr. Don Eduardo Estelat; Sr. Don Francisco Setuain; Sr. Don Jaime Macnaughtan and Sr. Don José Asensio.

Secretary.—Sr. Don José Asensio.

Capital.—6,500,000 pesetas, divided into 8,000 6 per cent. Participating Preference shares of 500 pesetas each, and 5,000 Ordinary shares of 500 pesetas each.

The financial year ends on December 31st.

This Company was formed to take over from La Compañía Concesionaria de Servicio Publico Español de Telegrafia sin Hilos, who were unable to carry out their obligations, the concession from the Spanish Government for the construction and exploitation of a public wireless telegraph service in Spain and its colonies. The Company has ten wireless telegraph land stations erected and working at Aranjuez, near Madrid, Cadiz, Barcelona, Tenerife, Las Palmas, Vigo, Soller, Finisterre, Santander, and Cape Palos, and has further stations in course of construction. The Company holds an exclusive licence from Marconi's Wireless Telegraph Company, Limited, to use and exploit its patents in Spain and her colonies.

The Company proposes to establish a direct wireless telegraph service between Spain and England by means of the Marconi Company's station at Poldhu, Cornwall.

The Marconi International Marine Communication Company, Limited

Incorporated.—April 25th, 1900.

Head Office.—Marconi House, Strand, London, W.C.

Directors.—Senatore G. Marconi, G.C.V.O., LL.D., D.Sc., Godfrey C. Isaacs (Managing Director), Alfonso Marconi, H. S. Saunders, M. A. Bramston, Captain H. Riall Sankey, C.B., R.E. (retired), Henry W. Allen, W. W. Bradfield.

Manager.—W. W. Bradfield.

Secretary.—Henry W. Allen, F.C.I.S.

Marine Superintendent.—Captain C. V. Daly.

Traffic Manager.—W. R. Cross.

Capital.—Authorised and issued £600,000 in £1 shares. (The capital was increased by 250,000 shares in July, 1917, and the shares were issued to existing shareholders at 35s. per share in August, 1917). 5½ per cent. first mortgage debentures (bearer). Authorised, £250,000. Issued and outstanding, £114,220 in £20 bonds. Secured (without trust deed) as a floating charge on the undertaking and all the property. Redeemable at par July 1st, 1941. Interest payable January 1st and July 1st.

Accounts and Dividends.—Accounts are made up to December 31st and usually submitted in June following. The accounts at December 31st, 1916, showed a profit of £96,748 for the year, and after payment of dividend and reserve for repayment of debentures £51,279 was carried forward. Reserve for repayment of debentures £8,610. General reserve account, £65,000. 5 per cent. dividend was paid for 1910, 7 per cent. for 1911, 10 per cent. for 1912, 1913, and 1914, 12½ per cent. for 1915, 15 per cent. for 1916. An interim dividend of 5 per cent. on account of the year 1917 was paid February 1st, 1918. (Last bearer coupon paid, No. 12.)

This Company was formed for the purpose of working throughout the world, except in the United States of America, Hawaii, Chili, and colonies or dependencies of those States, an exclusive licence for all maritime (being mercantile or yachting) purposes granted by Marconi's Wireless Telegraph Company, Limited. The Company has transferred to Associated Companies its rights in Canada, Argentina, Uruguay, Australasia, and all European countries and their dependencies except Great Britain and Ireland and Italy. In 1909 the Company and Marconi's Wireless Telegraph Company, Limited, entered into an agreement with the Post Office, which provided, in consideration of the payment of £15,000, for the transfer to the Post Office of the coast stations in the United Kingdom. This Company owns and operates the wireless telegraph apparatus on about 2,500 vessels of the mercantile marine.

Marconi's Wireless Telegraph Company, Limited

Incorporated.—July 20th, 1897, as "Wireless Telegraph and Signal Co., Ltd."; name changed as above in March, 1900.

Head Office.—Marconi House, Strand, London, W.C.

Directors.—Senatore G. Marconi, G.C.V.O., LL.D., D.Sc. (Chairman), Godfrey C. Isaacs (Deputy Chairman and Managing Director), Captain H. Riall Sankey, C.B., R.E. (retired), H. S. Saunders, Samuel Geoghegan, M.I.Mech.E., M.Inst.C.E.I., Alfonso Marconi, W. W. Bradfield, Henry W. Allen, M. A. Bramston.

Manager.—W. W. Bradfield.

Secretary.—Henry W. Allen, F.C.I.S.

Chief Engineer.—Andrew Gray.

This Company was formed to acquire Mr. Guglielmo Marconi's patents for wireless telegraphy in all countries except Italy, its colonies, and dependencies. The Company has substantial interests in the following Companies:—

Marconi Wireless Telegraph Company of America.

Marconi Wireless Telegraph Company of Canada, Limited.

The Marconi International Marine Communication Company, Limited.

Russian Company of Wireless Telegraphs and Telephones.

Amalgamated Wireless (Australasia), Limited.

Spanish and General Wireless Trust, Limited.

Société Anonyme Internationale de Télégraphie sans Fil.

Compañía Marconi de Telegrafía sin Hios del Rio de La Plata.

Compagnie Générale de Télégraphie sans Fil.

Relay Automatic Telephone Company, Limited.

The Pan-American Wireless Telegraph and Telephone Company.

The British and Overseas Engineering Syndicate, Limited.

In October, 1911, the Company took over the patents of the Lodge-Muirhead Syndicate, Limited. The Company has in hand contracts for the erection of wireless telegraph stations in many parts of the world. The Company owns the high-power wireless telegraph stations at Clifden, Ireland, and Poldhu, Cornwall, and has erected, or is erecting, other high-power wireless telegraph stations for account of its associated companies in Wales, New York, San Francisco, Honolulu, Buenos Aires, etc. In 1912 the Company erected new and extensive works at Chelmsford to enable it to cope with its rapidly increasing business.

Accounts and Dividends.—Accounts are made up at December 31st, and usually submitted in June following. The Company's accounts at December 31st, 1916, showed shares at cost in Associated Companies and Patents £1,403,923 (par value £2,487,450) and general reserve account £1,000,000. The profit for the year was £318,433, and after payment of dividends £380,106 was carried forward.

In respect of each of the years 1911, 1912, and 1913 the Company paid dividends of 17 per cent. on the preference shares and 20 per cent. on the ordinary shares; in respect of 1914 and 1915 7 per cent. preference and 10 per cent. ordinary dividends were paid; and in respect of 1916 the dividends were 12 per cent. on the preference shares and 15 per cent. on the ordinary shares. (A 7 per cent. Preference dividend and a 5 per cent. Ordinary dividend on account of the year 1917 were paid February 11th, 1918.) (Last Bearer Coupons paid No. 14 Preference, No. 13 Ordinary.)

Capital.—Authorised £1,500,000 in 1,250,000 Ordinary shares of £1 each and 250,000 Cumulative Participating Preference shares of £1 each. The Preference shares are entitled to a cumulative dividend of 7 per cent., and, after the Ordinary shares have received a 10 per cent. non-cumulative dividend, to share *pari passu* with the latter shares in surplus profits remaining. Issued, 250,000 Preference shares and 1,222,688 Ordinary shares.

Marconi Wireless Telegraph Company of America

Incorporated.—November 22nd, 1899, under the laws of New Jersey. Reorganised and commenced business April 1st, 1902.

New York Office.—Woolworth Building, New York City, 233, Broadway.

Factory in New York.—Edison Building, Duane Street, New York City.

Factory in New Jersey.—Aldene, N. J.

Directors.—Hon. J. W. Griggs (President), Senatore G. Marconi (Vice-President), Edward J. Nally (Vice-President), John Bottomley

(Vice-President), John L. Griggs, Godfrey C. Isaacs, James W. Pyke, James R. Sheffield, George S. De Sousa, J. Van Vechten Olcott, and Edward W. Harden.

President.—Hon. John W. Griggs.

Vice-President and General Manager.—Edward J. Nally.

Vice-President, Secretary, and Treasurer.—John Bottomley.

Chief Engineer.—Roy A. Weagant.

Traffic Manager.—George S. De Sousa.

Comptroller.—Charles J. Ross.

Capital.—Increased to \$10,000,000, divided into 2,000,000 shares of \$5 each, on April 18th, 1912. The financial year ends December 31st.

The Company has the sole right (subject to the rights transferred to the Pan-American Wireless Telegraph and Telephone Company, *q.v.*) to use and exploit the Marconi Patents in the United States of America, Hawaii, Philippine Islands, Cuba, Porto Rico, Alaska and the Aleutian Islands, and also the Patents of Sir Oliver Lodge, Professor Michael I. Pupin, Dr. Thomas A. Edison, Dr. James A. Fleming, Messrs. Weagant, Shoemaker, Butcher, Gray, Dunwoody, and Franklin.

The Company owns in the United States some sixty land stations for communication with ships at sea, including a high power station at Cape Cod capable of transmitting to vessels at sea to a distance of 2,000 miles. The Company also owns high power wireless telegraph stations at Belmar and New Brunswick, N.J.; Marion and Chatham, Mass.; Bolinas and Marshall, Cal.; and Kahuku and Koko Head, Hawaii. The Company owns and operates wireless apparatus on approximately 590 ships of the mercantile marine. The last financial statement made up to December 31st, 1916, shows a profit for that year amounting to \$259,888.80, which, added to \$541,887.52 standing to the credit of the profit and loss account at that date, makes the total amount to the credit of the profit and loss account \$801,776.32. Accounts made up as of December 31st in each year are submitted to the annual meeting of the stockholders, held on the third Monday of April yearly.

Marconi Wireless Telegraph Company of Canada, Limited

Incorporated.—By special Act of the Dominion of Canada on August 13th, 1903.

Head Office.—Shaughnessy Building, 137, McGill Street, Montreal.

Directors.—Andrew A. Allan (President), Senatore G. Marconi (Vice-President), Robert Bickerdike, M.P., G. M. Bosworth, J. N. Greenshields, K.C., Godfrey C. Isaacs, W. D. Birchall, E. J. Nally, Thomas Robb (Managing Director).

Traffic Manager.—G. H. Pearson.

Secretary and Treasurer.—Thomas Godman.

Acting Chief Engineer.—J. O. G. Cann.

Capital.—Authorised and issued capital, \$5,000,000 in 1,000,000 shares of \$5 each, fully paid. Special settling day on the London Stock Exchange, March 22nd, 1912, in 1,000,000 shares. The financial year of the Company ends at December 31st.

The Company owns the sole right to use and exploit the Marconi patents in the Dominion of Canada and the Colony of Newfoundland.

The Company concluded an agreement on April 5th, 1911, with

the Canadian Government, which provided that the Company should operate and maintain on behalf of the Canadian Government the Wireless Telegraph stations on the eastern coasts of Canada, twenty in all, for a period of twenty years. On September 17th, 1912, a further agreement was entered into with the Canadian Government providing that the Marconi Company should operate and maintain, on behalf of the Canadian Government, nine Wireless Telegraph stations on the Great Lakes. This agreement to run concurrently with the one concluded on April 5th, 1911.

An agreement between the Newfoundland Government and the Company came into force on April 20th, 1912, under which the Canadian Marconi Company has an exclusive licence to work Wireless Telegraph stations in the Colony of Newfoundland. The agreement also provides for the Company to operate eight Wireless Telegraph land stations on behalf of the Government, and to erect and operate four further such stations.

The Company receives under the above two agreements subsidies amounting to approximately \$95,000 per annum.

Under the agreements with the Newfoundland and Canadian Governments the following stations are operated:—

Ten stations for the Newfoundland Government, the controlling station of which, at Fogo, is the property of the Company.

Twenty-two stations in Eastern Canada and Newfoundland for the Canadian Government, two of which are the property of the Company.

Eight stations on the Great Lakes on behalf of the Canadian Government.

The Marconi Wireless Telegraph Company of Canada, Limited, owns the high-power Wireless Telegraph station at Glace Bay, by which, in conjunction with the station at Clifden, Ireland, a public Wireless Telegraph Service is conducted with Great Britain and the Continent of Europe. The Company owns and operates the Wireless Telegraph apparatus on nearly 100 vessels.

Improvements have been made to the Cape Race station, giving it a range of over 500 miles by day.

Under contract with the Canadian Government the Company has established permanent communication between Le Pas, Manitoba, and Port Nelson, Hudson Bay, a distance of 350 miles.

The Pan-American Wireless Telegraph and Telephone Company.

Incorporated.—State of Delaware, U.S.A. Amended Certificate of Incorporation, October 18th, 1917.

Offices.—233, Broadway, New York City.

Directors.—Hon. John W. Griggs, Edward J. Nally, James R. Sheffield, Washington Dodge, David Sarnoff, Edward W. Harden, Frank N. Waterman, George Pope, Nathan Vidaver.

President.—Edward J. Nally.

Vice-Presidents.—Washington Dodge and David Sarnoff.

Secretary.—Charles J. Ross.

Capital.—3,500 shares 7 per cent. preferred stock of \$100 each, cumulative after January 1st, 1921; 50,000 shares common no par stock. The financial year ends December 31st.

The Company has the exclusive right and licence to use the Marconi and Poulsen Patents for the sole purpose of radio or wireless communication between the United States of America and all countries of South America, Central America, Mexico, the Islands of Cuba, Porto Rico, and the West Indies.

Russian Company of Wireless Telegraphs and Telephones

Incorporated.—October 8th, 1908.

Head Office.—14, Lopuchinskaia, Petrograd, Russia.

Directors.—Senatore G. Marconi, G. C. Isaacs, S. M. Eisenstein, Pierre de Balinski, M. Salberg, Adrian Simpson (Managing Director), Admiral I. F. Bostrem, I.R.N. (retired), L. M. Eisenstein (Deputy Director).

Secretary.—Leon Eisenstein.

Capital.—Originally 1,200,000 roubles in 12,000 shares of 100 roubles each. This capital was increased to 1,800,000 roubles in November, 1911, in order to enable the Company to acquire a licence from Marconi's Wireless Telegraph Company, Limited. The capital was further increased in 1913 to 2,400,000 roubles and in 1914 to 3,000,000 roubles, divided into 30,000 shares of 100 roubles each.

The financial year ends December 31st (Russian date).

Dividends.—In respect of the years 1912 and 1913 dividends of 6 per cent. have been paid and 15 per cent. in respect of 1914 and 1915, and 17 per cent. for 1916.

The Company owns the Russian patents taken out in the name of S. M. Eisenstein, and also holds an exclusive licence to use and exploit the Marconi Company's patents in Russia (excluding stations for international communication or on vessels of Russian Mercantile Marine).

The Company has supplied the Russian Government with a large number of Wireless Telegraph stations, and has now a very large amount of work in hand for that Government. Communication has been established and messages exchanged between the Company's station at Petrograd and the Marconi Company's high-power station in Wales.

Société Anonyme Internationale de Télégraphie Sans Fil

Incorporated.—March 31st, 1913.

Head Office.—13, Rue Brederode, Brussels.

Capital.—2,250,000 francs, divided into 4,500 shares of 500 francs each, all issued and fully paid.

The last dividend paid was $7\frac{1}{2}$ per cent. for the year 1913.

The financial year ends at December 31st.

The Company exploits Wireless Telegraphy on vessels of the mercantile marine of all European countries excepting the United

Kingdom of Great Britain and Ireland, Germany, Austria-Hungary, Italy and France, and at the présent time owns and operates Wireless Telegraph apparatus on over 200 vessels.

Société Française Radio-Electrique, Société Anonyme

Incorporated.—4th April, 1910.

Head Office.—10, Rue Auber, Paris.

Works.—Suresnes (Seine): 18, Rue de Nanterre, and 51, Rue Carnot, and Belfort: Société Alsacienne de Constructions Mécaniques.

Directors.—M. G. Ferrand (Président), MM. de Beaumont, Class, Desachy, Fondère, Fourneau, Girardeau, Lippens, and O. de Rivaud.

Manager.—M. A. Fondère.

Chief Engineers.—MM. Bethenod and Girardeau.

Capital.—1,500,000 Frs., divided into 15,000 shares of 100 Frs. each, all issued and paid up.

The Company owns and operates the patents of MM. J. Bethenod, E. Girardeau, and M. Latour.

Spanish and General Wireless Trust (The), Limited

Incorporated.—February 16th, 1912.

Head Office.—Marconi House, Strand, London, W.C.

Directors.—Godfrey C. Isaacs (Managing Director), Alfonso Marconi, Captain H. Riall Sankey, C.B., R.E. (retired), Henry S. Saunders.

Secretary.—Henry W. Allen, F.C.I.S.

Capital.—Authorised, £350,000 in 350,000 shares of £1 each. Issued, 249,007 shares of £1 each. The object of the Company is to hold shares in the subsidiary Marconi Companies, in particular those of the Compañía Nacional de Telegrafía sin Hilos, the denomination of whose shares renders them difficult to negotiate on the London Stock Exchange. The Company holds at present 12,350 Bearer shares of 500 pesetas each in La Compañía Nacional de Telegrafía sin Hilos.

At June 30th, 1917, the profit and loss account showed a credit balance of £902 12s. 3d.

Wireless Press (The), Limited (Private Company)

Incorporated.—October 7th, 1910, under the title of "The Marconi Press Agency, Ltd." Name changed July 11th, 1914.

Head Office.—Marconi House, Strand, London, W.C.

Directors.—Godfrey C. Isaacs, Captain H. Riall Sankey, C.B., R.E. (retired), Henry S. Saunders, C. B. Clay, W. W. Bradfield, Captain C. V. Daly, and Henry W. Allen (Manager).

Secretary.—H. W. Corby, F.C.I.S.

Capital.—£5,000 in 5,000 shares of £1 each.

The Company is registered at the G.P.O. as a News Agency; it publishes the monthly magazines, "The Wireless World" and "El Marconigrama," and various well known books dealing with the subject of wireless telegraphy.

BIOGRAPHICAL NOTICES

Abraham, Henri.—General Secretary of the Société Française de Physique from 1901 to 1913, now Professor of Physics at the Sorbonne in Paris.

Arco, Graf Georg von.—Born at Grossgorschütz, Germany, he was educated at Berlin University and the Technical High School, Charlottenburg. In 1898 he was appointed assistant to the late Professor Slaby in the department of wireless telegraphy; later he joined the Allgemeine Elektrizitäts Gesellschaft, Berlin, continuing at the same time his work on the Slaby-Arco system of wireless telegraphy, and in 1903 receiving the appointment of manager of the Gesellschaft für Drahtlose Telegraphie. In December, 1906, he carried out practical wireless telephony over a distance of 35 km. (21·7 miles). In 1912 he exhibited high-frequency apparatus at the International Radiotelegraph Congress in London.

Armstrong, Edwin H.—Born in the United States on December 18th, 1890. After passing through the usual school curriculum, he graduated at Columbia University, obtaining his degree in 1913. Since that date he has concentrated his efforts on the advancement of radiotelegraphic science, working in conjunction with Professor Pupin, the President of the Institute of Radio Engineers, in his important research work at the Columbia Laboratories. Mr. Armstrong is himself one of the directors of the Institute, besides occupying the post of President of the Radio Club of America. He was recently awarded the medal of the Institute, into whose work he throws much energy and zeal, and to whose discussions and journal he has made many valuable contributions.

Asano, Dr. Osuke.—Born in 1859. He graduated at the Engineering College of the Tokyo Imperial University in 1881, and was recommended to Professor of the University. He was appointed Director of the Electro-Technical Laboratory of the Department of Communications in 1897, and continued his position until his retirement in 1914. He took many trips to Europe and America, first for the investigation of electrical engineering; second as a Japanese delegate of the International Wireless Telegraph Conference, Berlin, 1906; and third as a Japanese delegate of the International Conference on Electrical Units and Standards, London, 1908. He was the pioneer of the wireless investigation in Japan, and his investigation has continued since 1897 with M. Matsushiro, M. Saeki, Dr. W. Torikata, and others as his assistants. The so-called *Teishinsho* wireless system is due to his investigations. He also laid the submarine cable between Formosa and Osumi in 1895-7, the first long-distance submarine cable ever laid by a Japanese at that time. He was raised to the rank of Dr. Engineer in 1899. Besides superintending wireless and submarine cable, he supervises all electrical works in Japan. The development of electric power engineering as well as telegraphs and telephones in Japan owes much to his initiative. He received the 2nd Order of Merit in 1914.

Austin, Louis Winslow, Ph.D.—Head of the U.S. Naval Radiotelegraphic Laboratory, Washington, D.C. Son of Professor L. A. Austin, of Middlebury College; educated at Middlebury College, Clark University, and the Universities of Strassburg and Berlin. For a time he acted as assistant professor of physics at the University of Wisconsin, then joined the staff of the Physikalisch-Technische Reichsanstalt, Berlin, and has held his present position since 1908. Dr. Austin is especially interested in quantitative high frequency measurements, was a delegate to the International Radiotelegraphic Congress of London. During 1914 he held the office of President of the Institute of Radio Engineers.

Baker, T. Thorne.—Born March 19th, 1881. Educated at Mercers' School, London, and passed Intermediate Science examination at the University of London. After five years' work as research chemist he went to Paris in 1907 for the *Daily Mirror* to take up Prof. Korn's system of photo-telegraphy, and superintended the operation of the system between Manchester, Paris, and London. This was eventually superseded by a new system of his own invention. He has since devoted his time to high-frequency and X-ray research work.

Bangay, Raymond D.—Born at Lyme Regis in 1883. Mr. Bangay was educated at Epsom College and Finsbury Technical College, and joined the Marconi Company in 1902. After spending five years in America, during which time he was engaged in different branches of the Service, he returned to England and took up the study of Military Wireless Stations. In 1914 he was appointed Chief of the Field Station Department in the service of Marconi's Wireless Telegraph Co., Ltd. He is the author of "The Elementary Principles of Wireless Telegraphy."

Beggerow, Dr. Hans.—Born September 30th, 1874. Educated at the University of Berlin and at Freiburg-in-Breisgau, where he obtained his Doctorate. Since 1901 he has been expert adviser to the German Admiralty in all matters concerning wireless telegraphy, and since 1906 he has occupied a similar position in the Prussian Army.

Bellini, Dr. Ettore.—Born at Foligno, Italy, on April 13th, 1876, and educated at Naples University. In 1901 he was appointed Electrical Engineer to the Royal Italian Navy, and in 1906 he became Chief of the Naval Electrical Laboratory at Venice, in which latter capacity he was responsible for carrying out research work dealing with the employment of wireless telegraphy on warships and submarines. Later, in conjunction with Capt. Tosi, he invented the Radiogoniometer, an apparatus for directive wireless telegraphy. In 1910 the Bellini-Tosi system was installed at the Boulogne-sur-Mer station of the French Post Office.

Bethenod, J. F. J., was born at Lyons in 1883, and went through a course of technical study at the Central School of that city. He has for a number of years acted as the Assistant of Professor André Blondel. From 1903 onward, he published a large number of theoretical articles on Electro-Dynamic Machinery, and has entered into business relationship with a number of Constructional Engi-

neering Houses for the exploitation of his inventions. After a term of military service in the Engineers, when he served under Col. Ferrié, he specialised in wireless telegraphy. In this field, both scientific investigation and industrial practice owe several important contributions to his activities, a fact attested by articles which have appeared in the various French and foreign magazines. A number of wireless stations of varying power have been installed, wherein his devices are utilised. Of recent years, M. Bethenod has turned his attention to high frequency alternators, and has built machines giving remarkable results. He now holds the post of Engineer-in-Chief to the French Société Radio-Electrique.

Bjarnov, Alexander William.—Telegraph engineer, cand.-polyt.; Engineer-in-Chief of the Danish Telegraph Department's Third Engineering District; Fellow of the Danish Engineers' Association. Born in Copenhagen in 1874. Studied at the Polytechnic Academy of Copenhagen. From 1903 attached to the Telegraph Department. Has passed through the Naval and Torpedo Department Spark Telegraph School for Officers in 1907. Since 1909, together with Helmuth Schledermann, he has supervised the examination of wireless operators and the inspection of wireless stations on board ships flying the Danish flag. He is a member of the Board of Elektroteknisk Forening (Electrotechnic Association).

Blondel, André E.—Born in Chaumont, France, in 1863, and graduated at Paris University. He has been a frequent contributor to learned societies and technical journals on several subjects, including wireless telegraphy, in connection with which he invented, in 1893, a new apparatus which is known as the "Oscillograph," and which opened a fresh field for the study of alternate currents. He was the first to explain, mathematically, in 1893, the effect of inertia in the hunting of alternators. Among his other activities in wireless telegraphy, mention should be made of directed waves produced by a double aerial oscillating on the fifth harmonic, and also of a system of acoustically syntonized wireless telegraphy.

Blondlot, Professor Prosper René.—Born at Nancy in 1849. After completing his scientific studies in Paris, he returned to his native city, where he became Professor at the Faculty of Sciences. He is now an Hon. Professor and Correspondent of the Institute of France. Professor Blondlot has devoted considerable study to the problem of electromagnetic waves, the main object of his researches being to determine the speed of propagation of such waves. In the year 1891 he found for this speed the value 302,200 km. per second, and, in the year 1893, by another and quite different method, the value 297,200 km. per second.

Bradfield, William Walter.—Born in London in 1879. Mr. Bradfield's connection with wireless telegraphy dates from September 3rd, 1897, when he entered what was then known as the "Wireless Telegraph and Signal Co., Ltd." He acted as Electrical Assistant to Senatore Marconi all through the course of his experimental work in Radiotelegraphy on the Salisbury Plain, during 1897. In the year 1899 he installed the first wireless apparatus on British battle-ships, and a little later assisted in demonstrations to the United

States Government on board the United States battleship *Massachusetts*. In 1901 similar demonstrations conducted by him for the French Government resulted in the establishment of wireless communication between the French Riviera and Corsica. In the same year he supervised the erection of the well-known station at Siasconset and the Nantucket Lightship. In 1902 Mr. Bradfield accepted the position of Chief Engineer to the Marconi Wireless Telegraph Co. of America, a post he held until 1908, when he returned to England as Deputy Manager of the Parent Company and of the Marconi International Marine Communication Co., Ltd. In 1910 he became the Manager of both concerns, a position which he still occupies. In 1917 he was elected on the Board of the two companies.

Branly, Edouard.—Born at Amiens on October 23rd, 1844. He studied at St. Quentin College, and afterwards at Henry IV. College, Paris. He is a Fellow of the University, Doctor of Physical Science, and Doctor of Medicine. Some of his works relate to the electrical conductivity of radio-conductors. In 1900 the International Jury of Superior Precept Instruction awarded him a *grand prix* for his exhibition of radio-conductors, and the French Minister of Public Instruction made him a "Chevalier of the Legion of Honour" in recognition of the part he had played in connection with the discovery of "Wireless Telegraphy." He has constructed various independent distributing apparatus for producing tele-mechanical effects without wires. In January, 1911, he was elected a member of the Academy of Science, Paris.

Braun, Prof. Ferdinand.—Born at Fulda on June 6th, 1850, and studied at Marbourg and Berlin, graduating at the latter place in 1872. In October, 1895, he was appointed Director of the Physikalische Institut at Strassburg. His early works refer to mechanical oscillations, but for many years he has devoted himself mainly to electrical research, with special attention to wireless telegraphy. He has held several academic appointments of the highest importance, and is the author of numerous books and papers on wireless telegraphy and kindred subjects. In December, 1910, he received (with Senatore Marconi) the Nobel Prize for Physics.

Bright, Charles, F.R.S.E., M.Inst.C.E., M.I.Mech.E., M.I.E.E.—Consulting Engineer and Electrician to the Commonwealth of Australia. Born in London 1863 and educated at Lancing College and King's College. In 1881 he was articled to his father, the late Sir Charles Tilston Bright. Since that date he has been engaged, both as engineer and electrician, in the construction, testing, laying, and repairing of some 25,000 miles of submarine cable. He represented Australia as sole delegate at the International Radiotelegraphic Conference of 1912. He is a Vice-President of the Wireless Society of London.

Brown, Sidney George, M.I.E.E.—Born in 1873 in Chicago, U.S.A., of English parents, and brought to England when 18 months old. He received his education at Harrogate and London University. He made a special study of submarine telegraphy and is the inventor of the magnifying cable relay. In 1898 he invented the drum cable relay and the magnetic shunt. Since that date he has also devoted

much attention to telephony and wireless telegraphy and has achieved some important results, such as the carbon telephone relay, telephone transmission on land trunk lines, the improved wireless telephone receiver, and other inventions. He is a Vice-President of the Wireless Society of London, and a member of the Institute of Electrical Engineers.

Bullard, Capt. W. H. G., U.S.N.—Born December 6th, 1866, in State of Pennsylvania, U.S.A. In 1886 he was graduated at the United States Naval Academy. He subsequently served on ships of the Navy on the Atlantic, South Atlantic, Pacific, and Asiatic Stations, with shore duty, which had particular reference to the science of Electrical Engineering and its Development, in which he had specialised throughout his career. From 1912 to 1916 Captain Bullard held the post of Superintendent of the Naval Radio Service. He was the first to occupy this position; and under his supervision the communication system of the Navy Department was developed and enlarged. He was one of the delegates-plenipotentiary of the United States at the International Conference for Safety of Life at Sea, held in London in November, 1913. He was in charge, on behalf of the United States Navy, of the wireless operations contained in the series of experiments carried out between the Eiffel Tower and Arlington to determine longitude by means of wireless telegraphy.

Burstyn, Dr. W.—Born in Austria in 1877, and educated at the University of Vienna. He started his career as an electrical engineer with the Siemens-Schuckert Werke at Charlottenburg and with the Gesellschaft für Drahtlose Telegraphie.

Chamberlain, Eugene Tyler.—Son of General Frank Chamberlain. He was born in Albany, N.Y., on September 28th, 1856. Educated at the Albany Academy and Harvard College, graduating with honours in Metaphysics in 1878. After being in business for two years, he took up journalism and acted as legislative and political correspondent to the Associated Press. In 1893 he came to Washington and was appointed Commissioner of Navigation by President Cleveland. In 1903, on the creation of the Department of Commerce and Labour, he joined others in urging the importance of wireless telegraphy as a means of promoting safety of life on merchant vessels at sea, and he has since played a prominent part in promoting legislation on this subject. He was a delegate for the U.S.A. to the Convention on Safety of Life at Sea, at London, 1914.

Chevrelière (Baron de la).—Jean Marie Charles Aymé, Baron de la Chevrelière, was born at Poitiers (Department of la Vienne), and received the greater part of his education in that city. The title was given to the grandfather of the present holder by the Emperor Napoleon I., under letters patent dated 1811. After a course at the Military Academy of St. Cyr (1877-1879), followed by specialised training at Saumur, the Baron remained for fifteen years in the active army as cavalry officer, retiring with the grade of captain in 1892. At the present moment he holds his rank in the Reserve, and, during the war, was mobilised for three years from August

2nd, 1914, to July 5th, 1917, returning to civil life at the latter date. His permanent address at Paris is 23 rue Dumont d'Urville. Deeply interested from the start in radiotelegraphy, the Baron joined the Board of the Belgian "Société Anonyme de T.S.F." in 1901, and subsequently took a prominent part in the initiation of the "Compagnie Française Maritime et Coloniale de T.S.F.," of which he still remains president and managing director. From the beginning of 1914 to the end of January, 1918, he occupied the post of managing director of the Cie. Universelle de T.S.F., which on February 12th of the same year was merged in the Cie. Générale de T.S.F., of which the Baron is vice-president.

Chree, Charles.—Born 1860. Sc.D. of Cambridge; Hon. LL.D. of Aberdeen; F.R.S. Graduated M.A. at Aberdeen in 1879, with first-class honours in Mathematics and Natural Philosophy. At Cambridge in 1883 he was sixth wrangler, gaining also first-class honours in the final parts of the Mathematical and Natural Sciences Triposes. He became Fellow of King's College, Cambridge, in 1885; and was re-elected as Research Fellow in 1891. He has held the position of Superintendent of Kew Observatory since 1893, and is an ex-President of the Physical Society of London, besides being a member of the British Association Committee for Radiotelegraphic Investigation. During the last twenty years he has been largely concerned with geophysics, especially terrestrial magnetism and atmospheric electricity. He is author of "Studies in Terrestrial Magnetism," and a contributor of articles in the last edition of the *Encyclopædia Britannica*.

Clarke, E. Russell, M.B.E.—Born in 1871, he was educated at Charterhouse and Pembroke College, Cambridge, where he took a first-class in the Mathematical Tripos of 1893, and was equally successful in the Mechanical Science Tripos of the succeeding year. He became a barrister of the Inner Temple in 1895. He specialises in cases of a scientific nature, and has an expert knowledge of the laws on patents, designs, and trade marks. He is an associate of the Institution of Civil Engineers, an associate and member of council of the Institution of Electrical Engineers, a member of council of the Institution of Automobile Engineers, and a Vice-President of the Wireless Society of London. For the last twelve years Mr. Clarke has been closely interested in the development of wireless telegraphy, and has erected two stations, one in London, and one at Penbydlwl, Abergavenny, in Wales. He acted as a member of the Military Wireless Telegraph Committee in 1912-13. During the war he has been attached to the Staff of the Naval Intelligence Mission.

Cohen, Louis.—Born in 1876, he studied electrical engineering in Armour Institute of Technology, 1897-1901, and physics and mathematics in the University of Chicago and Columbia University, 1902-1905. He was on the Scientific Staff of the Bureau of Standards from 1905 to 1909 and Assistant Professor at the George Washington University, 1907-1909. In 1909 he was appointed chief of the research department of the National Electric Signalling Co., to take



RADIO COMMANDER F. G. CRESSWELL, R.A.N.

(For biographical details, see page 1089.)

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charge of the development of wireless apparatus. During his connection with that company he has also carried on extensive investigations in connection with the Heterodyne receiver. Since the latter part of 1912 he has been engaged in developing his own inventions in wireless telegraphy, particularly the Electrostatically Coupled Receiver, and recently he has also taken up the practice of consulting and research engineering. He is the author of the book "Formulæ and Tables for the Calculation of Alternating Current Problems," and has published scientific and technical papers dealing with problems in wireless telegraphy and kindred subjects.

Collette, August Everhard Rudolph.—Born on June 25, 1857, at Maastricht; studied for the profession of civil engineer at the Polytechnic School at Delft. He joined the staff of the Netherlands State Telegraphs in 1880, and was appointed Governmental Telegraph Engineer for special service in 1893. He succeeded his father (who retired in 1899) as Engineer-in-Chief of the Netherlands Telegraphs and Telephones, and as General Manager of the Technical Service. He has given special attention to wireless telegraphy from its first initiation, is a member of the Permanent Commission for Wireless Telegraphs, and the Chief Engineer of the Netherlands State Telegraphs.

Coursey, Philip R., B.Sc. (Eng.), F.P.S.L.—Born 1892. Educated at University College, London, and awarded Diploma in Electrical Engineering, with Distinction. Graduated with first-class Honours in Electrical Engineering at the University of London. He subsequently acted as Assistant to Dr. J. A. Fleming, F.R.S., in the Electrical Engineering Department, and Research Laboratories of University College, London; and is at present engaged under the Admiralty in the Inspection of Wireless Telegraph Apparatus. He is the author of several papers on Radio-telegraphy and telephony, read before a number of societies.

Crawley, Major C. G., Royal Marine Artillery, M.I.E.E.—Deputy Inspector of Wireless Telegraphy, General Post Office. He was engaged at wireless telegraph work in the Navy from 1903 to 1913, when he entered the service of the Post Office, from which he was lent to the Admiralty for wireless work on the outbreak of war.

Cresswell, F. G.—Radio Commander in the Australian Navy, this distinguished Australasian (for whose portrait see block facing page 1088) was the son of the late Rev. A. W. Cresswell, M.A., of Camberwell, Victoria, the smallest State (next to Tasmania) in the Australian Commonwealth. Mr. Cresswell entered upon his professional career in 1897, and received his training and experience in the course of serving under the firms of Messrs. John Danks and Sons, manufacturing engineers, of Melbourne, and Messrs. A. U. Alcock and Company, of Victoria. He afterwards transferred his activities to the Electric Light and Motor Power Company of Victoria, and later on entered Government service in the Electrical Engineers' Branch

of the Postmaster-General's Department, Melbourne. In 1907 Mr. Cresswell received a commission in the Naval Forces of the Commonwealth as Engineer Sub-Lieutenant detailed for electrical duties. He has served in the Royal Australian Navy from the time of its inauguration, and in 1912 received the appointment of Fleet Wireless Telegraph Officer, rising to the rank of Radio Commander and Acting Director of the Radio Service in July, 1916. On his return from naval operations in the Pacific during the early stages of the present war, Radio Commander Cresswell was selected to take over the control, under the Naval Board, of the Wireless Telegraphy Department of the Commonwealth, which had been transferred by Act of Parliament to the control of the Royal Australian Navy. His first work on taking over this appointment was that of organising the Commonwealth Radio Service on naval lines and under naval discipline. Commander Cresswell assisted at the capture of the German high-power wireless stations at Samoa, Namru and Rabaul, being mentioned in despatches for distinguished service. He is an Associate member of the Institute of Electrical Engineers (Great Britain) and a member of the Institute of Electrical Engineers (Australia).

Crookes, Sir William, O.M., F.R.S., D.Sc. (Hon.), LL.D.—Born in London June 17th, 1832. He entered the Royal College of Chemistry in 1848 as a pupil of Dr. Hofmann, and gained the Ashburton Scholarship in 1849. Later on he became senior assistant to Dr. Hofmann, which position he retained until 1854, when he received the appointment of Superintendent of the Meteorological Department of Radcliffe Observatory, Oxford. He was elected a Fellow of the Royal Society in 1863. Although his career has been mainly devoted to chemical research, he has carried out original investigations in radiotelegraphy, and has also published some interesting articles on the subject. He is a past-president of the British Association, the Chemical Society, and the Institution of Electrical Engineers. In November, 1913, he was elected President of the Royal Society.

De Forest, Dr. Lee.—Born at Iowa, U.S.A., and graduated at Yale College. Since 1896 he has been actively interested in wireless telegraphy and has made material contributions to the radio art.

Desbarats, George Joseph, C.M.G., B.A.Sc.—Deputy Minister and Comptroller of the Canadian Naval Service. Born at Quebec, January 27th, 1861. Educated at the Public Schools; Terrebonne College, Ecole Polytechnique, Montreal (honours and gold medal, 1879); Laval University (B.A.Sc., 1901). Engineer on construction and other public works; assistant to late John Page, Chief Engineer of Canals; Inspector, Railway Construction, B.C., 1892-96; Engineer of Construction, Galops Canal, 1896-99; employed in hydraulic survey work, St. Lawrence River, three years; rebuilt and enlarged the Government shipyard, Sorel, Quebec, 1901; Government Agent, Sorel, 1908-9; Acting Deputy Minister of Marine and Fisheries, Ottawa, 1908-9; Deputy Minister, 1909-10; received present appointment, June, 1910. Plenipotentiary for Canada at the Radiotelegraph Conference held at London,

England, 1902. Member of the Canadian Society Civil Engineers, 1897; Councillor, 1907; Vice-President, 1909; Councillor, Ecole Polytechnique, 1909.

Destruge, Guillermo.—Director General of Posts and Telegraphs of Ecuador from February, 1898, until the same month in 1906, Sen. Destruge established duplex telegraphic system and telephones in Quito, the capital of the Republic. He occupied the same post for a second time from March, 1912, and is still in office. During this last period the installation of wireless telegraphy in Ecuador has been instituted under his direction. He is President of the Radiotelegraphic Commission of the Republic and author of several scientific publications, the latest of which is entitled the "Co-relationship of Natural Forces."

Dubilier, William.—Born July 25th, 1888, in the United States of America. Mr. Dubilier is a radio engineer and inventor, and has since 1904 devoted much attention to wireless telegraph, telephone, and high frequency experiments. A consulting radio engineer, he is the Principal of the Dubilier Electrical Syndicate, Ltd., London, Eng., and of the Dubilier Condenser Co., Inc., New York. He has obtained over 150 patents and applications for wireless telegraph and telephone apparatus in almost all countries of the world. Address, "Aero Club, N.Y. City."

Eccles, W. H., D.Sc., A.R.C.S., M.I.E.E.—Born in Furness, Lancs, in 1875, and entered the Royal College of Science, South Kensington, in 1894. Three years later he was appointed demonstrator in the Physics Laboratory at the College, and in 1898 he graduated at the London University with first-class honours in Physics. In 1899 he entered Mr. Marconi's laboratory at Chelmsford and spent a great part of his time in the investigation of electrical oscillations of air wires and in "jiggers." He also devised a laboratory method for testing and classifying coherers, and results of a later study of coherers were presented as one of his D.Sc. theses. In 1901 Dr. Eccles was appointed head of the department of mathematics and physics at the South-Western Polytechnic, Chelsea, and afterwards University Reader in Graphics at University College, London. He is now Professor of Applied Physics and Electrical Engineering at the City and Guilds of London Technical College, Finsbury, E.C. He is honorary secretary of the Physical Society, examiner in mathematics at the London University, and honorary secretary of the British Association Committee for Radiotelegraphic Investigation.

Eichhorn, Gustav, Ph.D.—Born at Düsseldorf (Germany) on December 1st, 1867. After leaving the Realgymnasium he took up the study of physics, but this was interrupted by the death of his father, and for ten years he devoted himself to a business career; then he returned to the profession of his choice and continued his interrupted studies. After three years at Berlin, Munich, and Zürich, he took the degree in physics (Phil. Dr.) at the last-named University. He entered a wireless telegraph laboratory, and soon after he was appointed manager of experimental stations on the Baltic, where

for about eighteen months he conducted a number of investigations. The results of these are incorporated in a book which was published in England and Germany. He has contributed to various technical journals and has invented a device which is used in connection with wave meters and other instruments. He returned to Zürich in 1905 and two years later launched the *Jahrbuch der drahtlosen Telegraphie und Telephonie*, which is now a well-known annual publication. He is still engaged in practical and theoretical work in wireless telegraphy and telephony.

Eisenstein, S. M.—Born at Kief, Mr. Eisenstein was educated at the University of that city, afterwards studying at the University of Berlin and the Charlottenburg Polytechnic. He first turned his attention to wireless telegraphy in 1900, and in 1904 obtained his preliminary wireless patent, and established a private experimental laboratory. General Soukominoff, then commanding the troops of the Kief Division, heard of the young wireless enthusiast and encouraged him to carry out experiments on a large scale, eventually prevailing on the Russian War Office to provide the young scientist with sites for the erection of stations. The action, taken in consequence by the War Office, resulted in the realisation of the necessity for forming a wireless company; the project was speedily materialised and Mr. Eisenstein changed his headquarters from Kief to Petrograd. The new departure speedily justified itself, and in 1911 the original company coalesced with the Marconi Company, and the reconstructed Russian Organisation, with Mr. Eisenstein as Director and Principal Technical Adviser, assumed responsibility for the development of Russian wireless. Mr. Eisenstein is still the active and responsible chief of the "Russian Company of Wireless Telegraphs and Telephones."

Eitaro Yokoyama.—See Yokoyama, Eitaro.

Erskine-Murray, James, D.Sc., F.R.S.E., M.I.E.E.—Born in Edinburgh on October 24th, 1868, and after a course of six years' study under the late Lord Kelvin at Glasgow University he entered Trinity College, Cambridge, as a research student. From 1896 to 1898 he was assistant Professor of Physics and Electrical Engineering in the Heriot-Watt College, Edinburgh, and in 1898 he was appointed experimental assistant to Mr. Marconi. In 1900 he took up the post of lecturer and demonstrator in physics and electrical engineering at the University College, Nottingham, and in 1905 he was appointed to the lectureship in electrical engineering at the George Coates' Technical College, Paisley. In 1905 he took up consulting work in radiotelegraphy, and from 1907 to 1911 held the post of lecturer at the Northampton Institute, London. He has contributed papers to numerous learned societies, and is the author of several works on wireless telegraphy. In 1913 he joined the firm of Clark, Forde and Taylor, consulting engineers, and the firm is now Clark, Forde, Taylor, and Erskine-Murray. In the course of 1917 he joined the Royal Naval Volunteers Reserve with the rank of Lieutenant-Commander, and is now serving in that capacity.

Ferrié, Lt.-Colonel.—One of the French pioneers in Wireless Telegraphy, Colonel Ferrié was a member of the joint Military, Naval, and Telegraph Commission which inspected and reported to the French Government on the wireless station erected by the Marconi Company at Wimereux, in 1899, when the first cross-Channel working was achieved. He was also a member of the French Government Commission which watched the working of the Franco-Corsica communication by wireless in April, 1901. In 1904 he acted as the Official Representative of France at the International Electrical Congress at St. Louis (U.S.A.). Colonel Ferrié has, in the course of a long and brilliant career, contributed a large number of important articles and treatises dealing with Radio-Telegraphy which have won for him a high reputation among scientific men all over the world. At the present date he holds the Post of Technical Director of Military Wireless Telegraphy, being attached in that capacity to the Department of the French Ministry for War.

Fessenden, Reginald Aubrey.—Born at Milton, Canada, on October 6th, 1866. Educated at New York and Port Hope, Ontario. In 1886 he was appointed inspecting engineer to the Edison Company, N.Y. In 1892 he took up teaching work and conducted classes in physics and electrical engineering at Western University, and in 1893 he was appointed Professor of Electrical Engineering at Western University, Philadelphia. In 1900 he was appointed special agent to the U.S. Weather Bureau. Since that date he has devoted much attention to the development of a system of wireless telegraphy known by his name, and he has also carried out important experiments in wireless telephony. He has contributed articles on wireless telegraphy and telephony to many technical journals.

Fleming, Dr. John Ambrose, M.A., F.R.S.—Born in Lancaster on November 29th, 1849. Educated at University College School, London; University College; the Royal School of Mines; and sometime Fellow of St. John's College, Cambridge; Hughes Gold Medallist of the Royal Society. In 1880 he was appointed demonstrator in mechanics and applied-science to the University of Cambridge, and when University College, Nottingham, was opened in 1881, Dr. Fleming was selected as first occupant of the chair of mathematics and physics. A little later on he resigned this professorship to remove to London. On the creation of the Pender Chair of Electrical Engineering in 1885, the Council of the University College, London, appointed Dr. Fleming first occupant of that chair. After the incorporation of the University College with the University of London the title of Dr. Fleming's chair was changed to that of Pender Professor in the University of London. In 1912 Dr. Fleming was appointed University Professor of Electrical Engineering in the University of London. He has been a large contributor to scientific literature and research, and is the author of numerous well-known text-books, amongst which may be mentioned particularly his books on wireless telegraphy. He has given many courses of lectures at the Royal Society of Arts and the Royal Institution on wireless telegraphy and other subjects. His inventions and writings have assisted greatly

the development of radiotelegraphy. For his scientific researches he has been twice awarded the Institution Premium of the Institution of Electrical Engineers, and also a silver medal of the Royal Society of Arts.

Forberg, Olaf E.—Director of Telegraphs in Iceland, was born on November 22nd, 1871, in the Province of Finmark, in the north of Norway. At an early age he was attached to the Norwegian Telegraphic Service, first as a Telegraphic Clerk, later as the head of a station; from 1900 as the Manager of the Controlling Station "Violungnes" in the Romsdal. During the years 1893 to 1904 Mr. Forberg conducted the erection of several new Telegraphic Plants in Norway. In 1905 he was designated by the Norwegian Board of Telegraphs (after having been approached by the Icelandic and Danish Governments) as qualified to superintend the erection stations and organisation of the Telegraphic system in Iceland. In the spring of 1905, Mr. Forberg went to Iceland for examination, and in 1906 he built the Telegraphic Line from Reykjavik to Seydisfjord. The following year he was appointed Director of Telegraphs in Iceland, and controls both the wired and wireless nexus of the island.

Franklin, Charles Samuel.—Born in 1879, Mr. Franklin received his engineering and scientific training at Finsbury Technical College, under Professor Sylvanus Thompson. After some time spent in electrical work, first at Manchester and afterwards with the Norwich Electricity Company, Mr. Franklin joined the Marconi's Wireless Telegraph Company (then known as the "Wireless Telegraph and Signal Company") in 1899, and still remains in their service. He has during recent years been engaged (in conjunction with Mr. H. J. Round) in conducting experimental and research work on behalf of Senatore Marconi.

Frouin, M.—He is Director of the French Telegraphs and was one of his country's representatives at the International Radiotelegraphic Conference held in London in 1912. In 1917 he was transferred to another post and replaced by M. Villeary.

Geoghegan, Samuel.—In 1875 he was appointed Chief Mechanical Engineer to Messrs. Arthur Guinness and Co., of Dublin, in whose service he spent thirty years. He is a member of the Institution of Mechanical Engineers, the Midland Institution of Mining, Civil and Mechanical Engineers, the Institution of Civil Engineers of Ireland, and a member of the Council of the Royal Dublin Society. He is a director of Marconi's Wireless Telegraph Co., Ltd.

Girardeau, Emile, Managing Director of the Société Française Radio-Électrique. Born in 1882, Monsieur Girardeau received his education at the Ecole Polytechnique (after which he joined the Army and served as an officer in the Engineers). He is the author of various works, on a number of subjects relating to wireless telegraphy, and has played an important part in the creation and organisation of the Société Française Radio-Électrique, of which he is at once the founder and managing director.

Glazebrook, Sir Richard Tetley, M.A., D.Sc., F.R.S.—Born at Liverpool on September 18th, 1854. Sir Richard was educated at Trinity College, Cambridge, where taking his degree he pursued a study of physics at the Cambridge Laboratories under Clerk Maxwell. He was elected a Fellow at Trinity College, Cambridge, in 1877, and acted as Principal of the University College, Liverpool, from 1898-99. In the latter year he was appointed by the Royal Society as the First Director of the National Physical Laboratory, a position which he still holds. He was appointed a member of the Technical Committee inquiring into the Imperial Wireless scheme, and is author of a number of publications on Physical Optics, Laws and Properties of Matter, text-books on Heat, Light, Mechanics and Electricity. He received his C.B. in 1910, and was granted a knighthood in 1917.

Goldschmidt, Professor Dr. Rudolf.—Born March 19th, 1876, at Neubuckow, Mecklenburg, Germany. After finishing his education at Wiemar Municipal School, he studied engineering at Charlottenburg and Darmstadt Technical High School. In 1900 he was appointed engineer in the laboratory of the A.E.G. in Berlin. In 1901-2 he occupied the position of chief laboratory engineer and designer in Prague. In 1907 he became lecturer at Darmstadt Technical College. Here he practised as a consulting engineer, and also pursued the development of several inventions, chiefly occupying himself with the invention and design of high-frequency alternators for wireless telegraphy. In 1911 he established two large wireless stations at Elveisen, Province of Hanover, and Tuckerton, New Jersey, U.S.A., for wireless communication between Germany and America.

Goldsmith, Prof. Alfred N., B.Sc., Ph.D.—Born in New York City. Graduated from the College of the City of New York and Columbia University. Author of "Elements of Physics," "The Transmission of Canal Rays through Thin Partitions," "Radio Engineering at the College of the City of New York," "The Engineering Measurements of Radiotelegraphy," "Radiotelephony," and other works. Research worker in radio communication, particularly radiotelephony. Director of Radio Engineering work at the College of the City of New York. Editor of the "Proceedings of the Institute of Radio Engineers," Chairman of the Standardisation Committee of the Institute of Radio Engineers (1915), and Member of Board of Direction of the Institute. Professor Goldsmith is a Fellow of the Institute of Radio Engineers, a Member of the American Institute of Electrical Engineers, and a member of the American Physical Society.

Gottwaldt, Commander B. L., Royal Norwegian Navy.—Inspector of Wireless Telegraphy of the Norwegian Navy Department. He was born in Christiania in 1880 and entered the Naval Academy of the Norwegian Navy in 1898 and graduated as sub-lieutenant three years later. From 1901 to 1904 he attended the Military Academy of the Royal Navy and afterwards the Technical College in Charlottenburg, Berlin. At the latter college he studied electrical engineering, telegraphy, telephony, and wireless telegraphy. His

interest in wireless had been created during his service as an officer on board Norwegian warships, where wireless had been installed for experimental purposes during the first years of this century. In 1906 Mr. Gottwaldt went to England on behalf of the Norwegian Admiralty to attend to some special work with Messrs. Armstrong, Whitworth Co., Newcastle-on-Tyne. Upon his return to Norway he was entrusted with the charge of the wireless telegraphy of the Royal Norwegian Navy, which position he still holds. Appointed a Commander in 1912, he has several times been entrusted with the control and test of wireless apparatus ordered in England and Germany by the Norwegian Government. In 1912 he was one of the delegates from Norway at the International Radio Conference in London.

Gray, Andrew.—Born at Glasgow in 1873, and educated at the Glasgow University and Royal Technical College, taking the diploma of the latter in electrical engineering. On leaving college he served as assistant to the late Professor Andrew Jamieson, of the Royal Technical College. In 1893 he joined the West India and Panama Telegraph Company, Ltd., and served as assistant electrician, chief electrician, and telegraph engineer. He entered the service of the Marconi Company in 1899. He introduced the Marconi system to the Hawaiian Islands, and—with the assistance of Mr. T. E. Hobbs, also a member of the Marconi service—organised the telegraph working and trained the native operators of the Inter-island Telegraph Company of Honolulu. He received the appointment of Chief of Staff to the Marconi Company under Senatore Marconi in 1901, and became Chief Engineer in 1910. He has been an Associate of the Institution of Civil Engineers since 1898.

Hammond, John Hays, Jr.—Born in San Francisco, April 13th 1888. educated at Preparatory Schools in England and the U.S.; graduated from the Yale-Sheffield Scientific School in 1910. He has been working ever since on the development of the system of radio control of torpedoes and other moving bodies, and has made application for 137 U.S. patents. The Board of Ordnance and Fortifications of the U.S. Army and the Secretary of War have recommended to Congress that these applications be purchased in their entire rights by the U.S. for the sum of \$830,000. Mr. Hammond is the originator of the system of aerocoastal patrol, comprising aeroplanes equipped with wireless, which has received the endorsement of President Wilson, the Secretary of Navy, and the Secretary of War. He has written for private circulation a four-volume treatise on the Art of Teledynamics. He has been Treasurer of the Institute of Radio Engineers, and Manager and Chairman of the Committee on Admissions. He is a member of the American Institute of Electrical Engineers and Associate Delegate to the International Telegraphic Conference in London in 1912.

Hogan, John L., Jr.—Born in Philadelphia, Pa., U.S.A. He attended Sheffield Scientific School of Yale University, specialising in physics and mathematics. He assisted Dr. Lee De Forest in his work on experimental radiotelegraphy, and in the development of the



MR. CHAS. J. PANNILL, DEPARTMENT OF NAVAL COMMUNICATIONS,
WASHINGTON, U.S.A.

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grid audion in 1906 and 1907. In 1909 he joined the staff of the National Electric Signaling Company at Brant Rock, Mass., and in 1914 was appointed Chief Research Engineer of that Company. He is the author of "The Heterodyne Receiving System," "Wireless Telegraphy in Railroad Service," "Transatlantic Radiotelegraphy," and numerous other articles and papers published in the Proceedings of the Institute of Radio Engineers, the *Electrician* (London), the *Electrical World*, the *Jahrbuch der D.T.U.T.*, etc. He is a Fellow of the Institute of Radio Engineers, and their Vice-President in 1916; a member of the American Association for the Advancement of Science, of the American Institute of Electrical Engineers, and honorary member of the Radio Club of America. In 1916 he held the post of Chairman of the Standardisation Committee of the Institute of Radio Engineers. He is the holder of ten patents embodying inventions relating to radiotelegraphy.

Hope-Jones, Frank.—Chairman of the Wireless Society of London. He was born in 1867, and from 1890 to 1895 he was associated with his elder brother, Robert Hope-Jones, in some of his earliest applications of electricity to organ-building. Since then he has established the business of electric time service on a scientific basis. He is a member of the Institution of Electrical Engineers, the British Horological Institution, etc., and is author of numerous contributions to technical journals and to the Proceedings of Scientific Societies.

Howe, Prof. George William Osborn, D.Sc., M.I.E.E.—Born 1875, at Charlton, Kent, he received his education at Woolwich Polytechnic and Durham University. After nine years with Siemens Bros., at Woolwich, and Siemens and Halske, at Charlottenburg, and two years as lecturer at Hull Technical School, he was appointed lecturer and later Assistant-Professor of Electrical Engineering at the City and Guilds Engineering College. He is a D.Sc. of Durham and an honorary D.Sc. of Adelaide University. He has read several papers on radiotelegraphy before the Royal Society, the British Association, the Physical Society, etc., and in 1912 was awarded the silver medal by the Royal Society of Arts for his paper on "Some Recent Developments in Wireless Telegraphy." He is on the Council of the Physical Society, and is a member of the Radiotelegraphic Research Committee of the British Association and of the British Committee of the International Radiotelegraphic Commission.

Hoyle, Lieut. Bertram.—Is a native of Oldham and obtained his technical and practical education at the School of Technology, Manchester, of which he is now an Associate. He also entered as a student at the Victoria University, Manchester, and in 1907 obtained the Certificate of that University in Technology, in the Department of Electrical Engineering; and also the Diploma of the School. He has since acquired the degree of M.Sc. Tech. of that University and is an A.M.I.E.E. He then entered the service of Messrs. Henry Simon, Ltd., Manchester; and later on that of Messrs. S. Z. de Ferranti Ltd., Hollinwood. In 1911 Mr. Hoyle obtained a post as Assistant Lecturer and Demonstrator in Electrical Engineering at the School of Technology, Manchester, which he still holds. Mr. Hoyle has had charge of the design and erection

of the wireless station with which the School of Technology is now equipped. He enlisted in the early part of 1915 as a motor cycle despatch rider, and has served on the Western Front. In September, 1915, however, he was gazetted Lieut. R.N.V.R. He is author of a number of interesting essays and monographs, including an original paper of great interest on "The Influence of Temperature and Pressure on the Sensitivity of the Carborundum Crystal Detector."

Illingworth, Arthur Holden, P.C., M.P.—Born 1865, has represented the Heywood Division of South-East Lancashire since 1915. He is a partner in Daniel Illingworth and Sons, of Bradford. On the construction of the War Cabinet formed by Mr. Lloyd George in December, 1916, Mr. Illingworth became Postmaster-General, and as such is in supreme direction of Wireless Telegraphy as far as the United Kingdom is concerned.

Isaacs, Godfrey C.—Educated in England, France and Germany. He began life in his father's business, and at eighteen years of age he was manager of the great concern which he had entered as a lad. In 1910 he was appointed Managing Director of Marconi's Wireless Telegraph Co., Ltd., and the Marconi International Marine Communication Co., Ltd.

Janet, Paul.—Professor of Physics at the University of Paris, Director of the Central Laboratory and of the High School of Electricity. He was born on January 10th, 1863, in Paris, and studied at the Lycée Louis-le-Grand and afterwards at the High School. He is a member of the French Society of Physics, the International Society of Electricians, and the Society of Civil Engineers of France. From 1886 to 1894 he was Professor of Physics at the University of Grenoble. Professor Janet has published several important works, and from the point of view of wireless telegraphy he was the first to make a successful experiment in electric resonance by means of high-frequency currents in 1892; this is the phenomena used to-day in wavemeters.

Kennedy, Sir A. B. W., F.R.S.—Born in London, March 17th, 1847. He has had great mechanical engineering experience and has been President of the Institution of Civil Engineers and the Institution of Mechanical Engineers. He has designed electric lighting and power stations for many companies and corporations, and has also been engaged in railway work. He received the honour of knighthood in 1905 on account of his services to the Admiralty. He was a member of the Technical Committee which was appointed by the Postmaster-General to consider the Imperial Wireless scheme. He is a civilian member of the Ordnance Board, a member of the Munitions Inventions Panel, and vice-chairman of the Anti-Aircraft Equipment Committee (Ministry of Munitions). He is also consulting electrical engineer to the L.N.W.R. and the L.S.W.R., and the London County Council.

Kennelly, A. E.—Born in Calaba, Bombay, December 17th, 1861. He was educated in England, Scotland, Belgium, France and Italy. He is a Past-President of the American Institute of

Electrical Engineers, a member of the American Associated Illuminating Engineers; held the post of President, in 1916, of the Institute of Radio Engineers; acted as Vice-President of the International Electrical Congresses, Paris and Turin; and as General Secretary of the Congress at St. Louis, Mo., U.S.A. He left school in 1875 to become a telegraph operator in the Eastern Telegraph Company. In 1881 he was Chief Electrician on Cable Ship; Senior Electrician ship staff, E.T.C., 1886. From 1886-1892 he became principal electrical assistant to Thomas A. Edison, in the laboratories at Orange, N.J.; Consulting Engineer in Philadelphia, and from 1893-1900 worked in partnership with E. J. Houston, of the Thomson-Houston Company. He was Engineer-in-Chief when the cables were laid from Vera Cruz to Campeche in 1902. Since then he has been Professor of Electrical Engineering at Harvard University and also at Massachusetts Institute of Technology, since 1914. He is a Corresponding-Fellow of the British Association for the Advancement of Science; a member of the Institution of Electrical Engineers of London, and has twice received one of its premiums for papers. He is now Director of Research Division of the Electrical Engineering Department, Massachusetts Institute of Technology, and Fellow of the American Academy of Arts and Sciences. He has written twenty-three books as author or collaborator, one of which is considered a standard elementary exposition of wireless telegraphy, and is author of more than 120 scientific papers. His honorary degrees include the S.D. degree of the University of Pittsburg and the A.M. degree of Harvard University. In past years he has been Chairman and Secretary of Standards Committee, American Institute of Electrical Engineers, and Secretary of the American Committee of the International Electro Technical Commission. Professor Kennelly has specialised in alternating currents.

Kimura, Shunkichi.—Born in 1866. After graduating at the Scientific College of the Tokyo Imperial University, 1888, he was appointed first, a lecturer of the First High School; second, Professor of the Second High School; and third, Professor of the Naval College. He pursued his studies in England during 1901, and on his return was appointed Wireless Engineer to the Navy Department, filling that position until his retirement in 1914. Many inventions and improvements in naval wireless are due to his investigations, and these were proved very efficiently by the test of experience in the Russo-Japanese war. He was sent to Berlin in 1906 as a Japanese delegate to the International Wireless Telegraph Conference. He is now a councillor of the Nippon Radio Works.

Kolster, Frederick A.—Born in Geneva, Switzerland, January 13th, 1883. He was educated in the Public Schools of Cambridge, Mass., and at Harvard University, and became assistant to John Stone Stone from 1902-1908, playing an active part in wireless engineering up to 1912. He then joined the scientific staff of the U.S. Bureau of Standards, and has since been closely associated with the radio work of the U.S. Government. He is the inventor of a direct reading decremeter and other devices, a Fellow of the Institute of Radio Engineers, and filled the position of Attaché to American

delegation representing the U.S. in London International Radio Convention in 1912.

Koomans, Nicolaas.—Born December 18th, 1879, at Delft. Studied at Delft for mechanical and electro-technical engineer, obtaining his certificate at the age of twenty-one in 1901. After that he was during one year assistant in applied geometry, and during one and a half years in physics and electrical engineering at the Technical High School at Delft. He subsequently entered the Government Telegraph Service. He graduated in 1908 at the Technical High School at Delft as Doctor in Technical Sciences on the strength of a dissertation, "Regarding the Influence of Self-Induction in Telephone Conducting Wires," containing theses in which are laid down the results of, and the conclusions from, experiments and measurements on pupin cables of the Dutch telegraph administration. He was joint-founder and editor of the *Monthly Review for Telephony and Telegraphy*, which originally was intended to be an international magazine, but which was limited to the Netherlands through the outbreak of the war. He was also joint-founder and member of the managing board of the Dutch Society for Radiotelegraphy (Nederlandsche Vereeniging voor Radiotelegrafie), and is a member of the International Electro-technical Commission. Mr. Koomans holds an appointment as Professor in Physics and Theoretical Electrical Engineering at the school of the Dutch Post and Telegraph Administration, and supervises the instruction of all the higher officials.

Korn, Professor Arthur.—Born at Breslau, Germany, May 20th, 1870. Dr. Korn studied at Leipzig and Paris in Mathematics and Physics. In 1903 he was appointed Professor of Physics at the University of Munich, retiring from that position in 1908. He is best known as the inventor of a system of telegraphic transmission of photographs, and in 1907 the first photograph was transmitted under his system from Munich to Berlin, a distance of 600 kilometres. Professor Korn has also invented a system of telautography. His work, entitled "Elektrische Fernphotographie und Aehnliches," appeared at Leipzig in 1904, and a larger work, entitled "Handbuch der Phototelegraphie und Telautographie," was published by him in 1911, in collaboration with Dr. Glatzel.

Kujirai, Kotaro.—Born in 1882. Graduated at the Electrical College of Tokyo Imperial University, 1907, and after one year's service with Dr. Torikata as Wireless Engineer in the Department of Communications, became Assistant Professor of the Tokyo Imperial University, and still holds that post. He continued his investigations, has many inventions to his credit, and was awarded the Academy prize and medal of the Japanese Imperial Academy.

Latour, Marius. was born in October, 1875, and is a native of the South Western District of France. He owes his scientific and technical training to the University of Paris and to the Parisian Ecole Supérieure d'Electricité. M. Latour has, for many years past, acted as Consulting Engineer to the General Electric Company of America, and is the author of numerous inventions in the world of electro-dynamics. From the start, he paid special attention to the construction of high frequency machines, which he originally attempted

to design in the shape of monophasé or polyphasé machines grouped in cascade; later on he analysed the essential features of machines based on this principle, and showed their analogy and close relationship with those of Professor Goldschmidt. As long ago as 1904 he presented an original paper to the Technical Manager of the General Electric Company at Schenectady setting forth the principle of the reception of continuous waves by beats, and this principle of beat reception is to-day the one in general use. More recently M. Latour has specialised in the direction of constructing amplifiers of low and high frequency for wireless telegraphic reception, for the benefit of the French Société Radio-Électrique, of which he is consulting engineer.

Lodge, Sir Oliver, F.R.S.—Born at Penkhall, Staffs, on June 12th, 1851.

He was educated at the Newport (Salop) Grammar School, and was intended for a business career, but being attracted to science he entered University College, London, in 1872, and graduated D.Sc. five years later. He was reader in natural philosophy at Bedford College for Women, and Assistant Professor of Physics in University College, London, for several years, then Professor of Physics in University College, Liverpool, for nineteen years, before being appointed, in 1900, the first Principal of the new Birmingham University. He was knighted in 1902. He has distinguished himself in various spheres of thought, and his original work includes investigations on lightning, the seat of the electromotive force in the voltaic cell, the phenomena of electrolysis and the speed of the ion, the motion of the ether near the earth, and electromagnetic waves and wireless telegraphy. His patent for syntonic wireless telegraphy has been acquired by the Marconi Co. He has held the position of President of the British Association as well as that of President of the Physical Society, and of the Society for Psychical Research, and has made many important contributions to the literature of science.

Lombardi, Dr. Luigi.—Born on August 21st, 1867, at Dronero (Italy).

In 1890 he obtained the diploma of civil engineering at the Royal Engineering School of Turin. He gained the diploma in electricity at the Industrial Museum of Turin in 1891 and won the Gori-Feroni prize. He has been professor of electricity at the Zürich Polytechnic School (1895-97), at the Industrial Museum of Turin (1897-1900), and since 1901 at the Royal Polytechnic School in Naples. He has published a book on the "Scientific Principles of Electricity" and a text-book on electrotechnics, besides numerous papers on kindred subjects. He is the author of a study on the employment of condensers for the transmission of electricity, which obtained for him the Kramer Prize of the Lombard Institute. He is the inventor of a special high-tension electrical condenser. He was a delegate of the Italian Government at the St. Louis International Congress of Electricity, and has been President of the International Congress held in Turin in 1911 as well as of several technical and scientific societies.

Loring, Commander F. G., R.N., M.I.E.E.—Inspector of Wireless Telegraphy at the General Post Office. He entered the Navy in

1882 (retired 1910). He was lieutenant on board H.M.S. *Victoria* when that vessel was rammed and sunk by H.M.S. *Camperdown* off Tripoli in 1893, and received the bronze medal of the Royal Humane Society for saving two lives. In charge of the Admiralty shore wireless telegraph stations from 1902-8. In 1906 he acted as delegate for the Admiralty at the Berlin International Conference on Wireless Telegraphy. In 1908 he was appointed Inspector of Wireless Telegraphy and he represented the Post Office at the International Conference on Wireless Telegraphy held in London in 1912. At the International Conference on the Safety of Life at Sea (London, January, 1914) he acted as technical adviser to the Board of Trade on all matters connected with wireless telegraphy.

McLachlan, Norman W., D.Sc. (Eng.), A.M.I.E.E.—Born at Long town, Cumberland, in 1888. Dr. McLachlan was educated first at Carlisle Grammar School and afterwards at the George Watson and the Heriot-Watt Colleges, Edinburgh. He served an apprenticeship with Messrs. Bruce, Peebles and Co., and in 1909 was appointed Lecturer in Engineering and Mathematics at Newcastle-on-Tyne. In 1913 he was appointed Superintendent of a branch technical institute, and Supervisor of Classes in Engineering Subjects in the Liverpool branch technical institutes. Dr. McLachlan has devoted much time to research work in the Applied Electricity Laboratories of the Liverpool University. He is the author of a text-book on "Practical Mathematics," and has published a number of papers in the *Journal of the Institution of Electrical Engineers* and other scientific journals, on the "Magnetic Behaviour of Iron Under Alternating Current Magnetisation of High and Low Frequency." He has read papers before the British Association on "The Heating of Iron When Magnetised at High Frequencies" and on "Characteristic Curves of a Poulsen Arc Generator." Dr. McLachlan is an Associate of the Heriot-Watt College and a D.Sc.(Engineering) of the University of London. He is at present engaged in aeronautical research work at the Royal Aircraft Factory.

Madge, Henry Ashley, B.A., M.I.E.E.—Expert in Wireless Telegraphy to the British Admiralty. Born February, 1879. Peterhouse, Cambridge (1898-1902). After a short time as junior engineer to the Marconi Company, he entered the Admiralty's service, and received his present appointment in 1905.

Makower, A. J.—Born May 9th, 1876, he received his scholastic training at the University College School in Gower Street, and afterwards at the college itself, between the years of 1884 and 1895. He studied at Trinity College, Cambridge, taking his degree in 1898. Mr. Makower thence proceeded to the famous Technical School of Charlottenburg, Germany, and obtained a valuable insight into German methods. Returning to England he joined the British Thomson-Houston Company, Rugby, and in 1904 received an appointment at the South-Western Polytechnic, Chelsea, where he first came into contact with Dr. Eccles, a distinguished colleague, with whom he has acted on many occasions. Mr. Makower is head of the Electrical Engineering Department at the Polytechnic, and is closely connected with the University of London,

of which he is a recognised teacher. He also acts as Secretary of the Board of Studies in Electrical Engineering, and is an author of many valuable contributions in the way of papers on wireless subjects.

Marchant, Edgar Walford, D.Sc., M.I.E.E.—David Jardine Professor of Electrical Engineering in the University of Liverpool. Born in 1876; educated at the Central Technical College, he obtained Siemens's medal and was elected to a Salomon's Scholarship of the Institution of Electrical Engineers. After serving an apprenticeship he was appointed Superintendent of Lord Blythwood's Laboratories and Workshops at Renfrew, N.B., where he carried out a number of investigations, including experiments in wireless telegraphy. Subsequently he acted for a year as senior assistant to the late Professor Silvanus P. Thompson, and in 1901 was appointed Lecturer and later (1903) Professor of Electrical Engineering in the University of Liverpool. He has published papers on the magnetisation of iron under the influence of a high-frequency discharge from a condenser, on the conditions affecting variations in strength of wireless signals, and on many other subjects. He was elected Chairman of the Manchester Local Section of the Institution of Electrical Engineers in 1913-14, and President of the Liverpool Engineering Society in 1915-16, and is a Vice-President of the Wireless Society of London. He was one of the British delegates at the International Scientific Commission on Wireless Telegraphy, held at Brussels in April, 1914.

Marchant, W. H.—Born in London, March 22nd, 1881. Took up experimental work in connection with wireless telegraphy in 1904. From 1906-1911 he served with the Deforest Syndicate, Poulsen Company, and Lepel and Anglo-German Wireless Companies, being chiefly engaged in experimental work. Since 1911 he has devoted himself mainly to literary work and to teaching.

Marconi, Alfonso.—Born at Bologna in 1865, he is about eight years older than his distinguished brother. He was educated at Bedford Grammar School in England and later at Technical Colleges in Florence and Leghorn. He joined the board of Marconi's Wireless Telegraph Company and the Marconi International Marine Communication Co., Ltd., in July, 1909.

Marconi, Senatore Guglielmo, G.C.V.O., LL.D., D.Sc.—Born at Bologna, in Italy, on April 25th, 1874, he is Irish on his mother's side. He was educated at Leghorn and Bologna University, and first began to interest himself in the problem of wireless telegraphy in 1895. In the following year he came to England, and took out the first patent ever granted for a practical system of wireless telegraphy by the use of electric waves. His earliest experiments in England were made at Westbourne Park. Shortly afterwards Mr. Marconi saw Sir W. H. Preece, and at his request made some experiments for him and the Post Office officials. Some further experiments were made in May, 1897, in the Bristol Channel, wireless communication being established between Lavernock and Brean Down, a distance of nine miles. On the invitation of the Italian Government, Mr. Marconi subsequently went to Spezia, where a

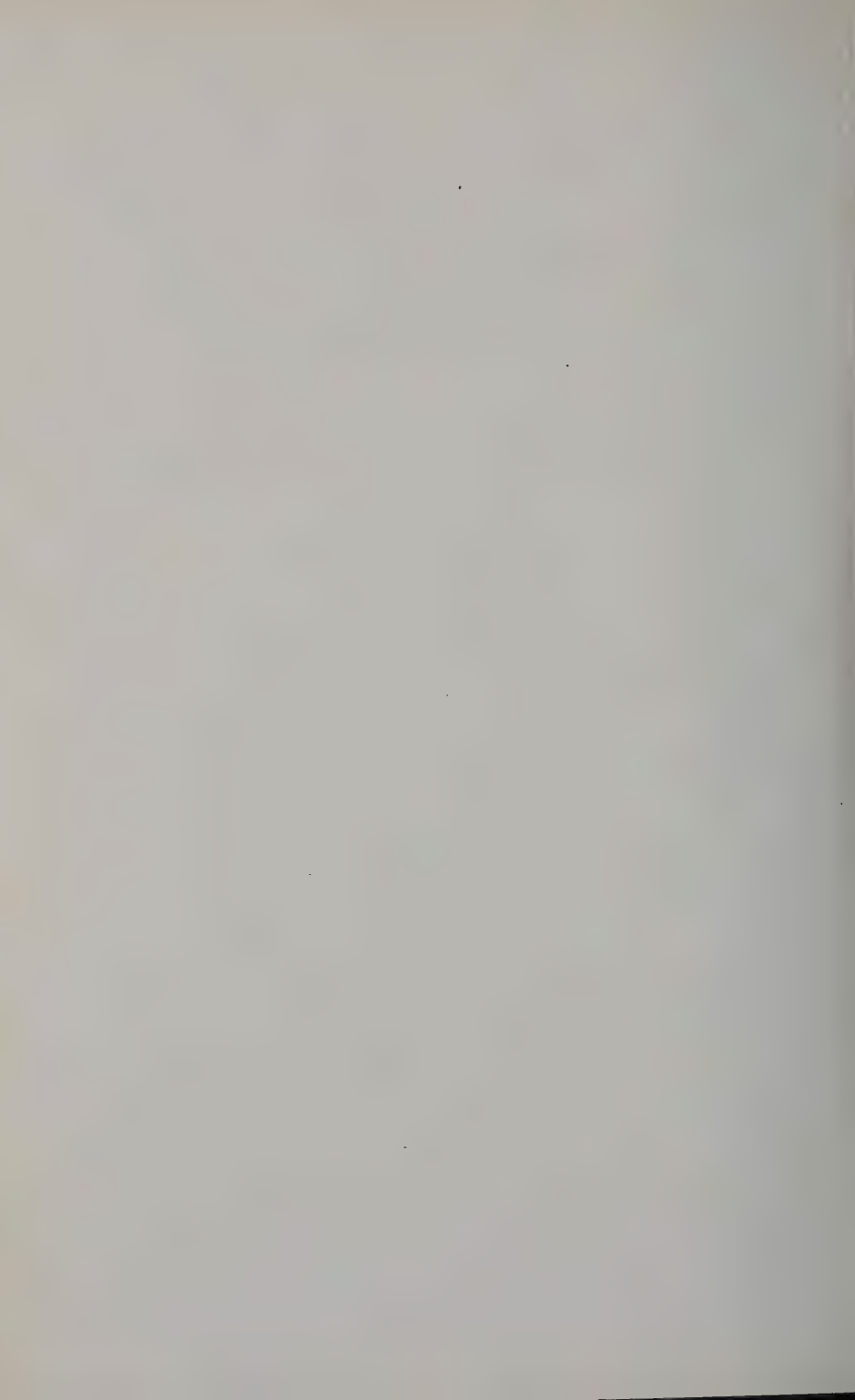
land station was erected, which was kept in constant communication with two Italian battleships working from a distance of twelve miles. The Italian Government conferred upon Mr. Marconi the honour of knighthood, and his system is now used extensively in Italy. On his return to England further experiments were conducted at Salisbury (between Salisbury and Bath, a distance of thirty-four miles). On July 20th, 1897, the Wireless Telegraph and Signal Co., Ltd.—now known as Marconi's Wireless Telegraph Co., Ltd.—was established, and two permanent stations were put up. In July, 1898, the *Dublin Express* gave day by day a Wireless Telegraphic report of the yacht races during Kingstown Regatta week, and proved the usefulness and facility with which the system can be applied to commercial purposes. Later Mr. Marconi established communication between Queen Victoria's residence at Osborne House, Isle of Wight, and the Royal yacht *Osborne*, and her late Majesty was kept apprised of the progress made by the then Prince of Wales during the process of recovery from a serious accident. In December, 1898, Mr. Marconi installed apparatus to provide communication between the South Foreland lighthouse and a lightship on the South Coast. Mr. Marconi is a member of the Institution of Electrical Engineers, and read a paper on "Wireless Telegraphy" before the members in 1899. Early in 1901 telegraphic communication was established between two points more than 250 miles distant, and at the end of that year Mr. Marconi transmitted signals from Poldhu, in Cornwall, to St. John's, Newfoundland. In February, 1902, he received on board the s.s. *Philadelphia*, in the presence of the officers, good messages on the tape when at a distance of over 1,500 miles from the transmitting station, and signals at over 2,000 miles. In December, 1902, the station established at Cape Breton, Nova Scotia, under a contract with the Canadian Government, for transatlantic wireless telegraphy, was put into communication with the Cornwall station at Poldhu, and inaugural messages were transmitted to H.M. the King of England, H.M. the King of Italy, and others, and to *The Times* newspaper. In October, 1903, during the voyage of the R.M.S. *Lucania*, Mr. Marconi established communication between this ship and the Marconi stations at Glace Bay, Canada, and Poldhu, Cornwall, England, and a bulletin was published and issued daily to each passenger. A powerful station at Clifden, on the West Coast of Ireland, was opened early in 1907, for the establishment of commercial communication with the American continent (Glace Bay). Mr. Marconi's work has been recognised by many governments and seats of learning; he has been decorated by the King of Italy and the ex-Czar of Russia, is an honorary doctor of many universities, including Oxford, Glasgow, Aberdeen, Liverpool, and Pennsylvania, besides having received the freedom of the principal Italian cities. In 1909 (in conjunction with Professor Braun) he was accorded what is perhaps the highest distinction that can be obtained by any scientist—the Nobel Prize for Physics. In 1914 he was elected a senator in the Italian Parliament, being formally introduced to the Assembly on March 27th, 1915. On July 24th, 1914, the King bestowed upon him the Honorary Knighthood of the Grand Cross of the Victorian Order. He also holds many scientific awards granted by various societies



MAJOR ALBERT WIBIER, HEAD OF THE WIRELESS SECTION OF THE BELGIAN ARMY.

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and institutions, of which we may quote as a comparatively recent instance his presentation by the Royal Society of Arts, on April 12th, 1915, with their Albert Medal, annually granted for distinguished services to science. Immediately on the declaration of war by Italy, Senatore Marconi placed his services at the disposal of King Victor, and was given the rank of Lieutenant in the Italian Army. He has been employed on important military missions to England by the Italian Government, and on July 29th, 1916, was promoted to be Captain "for exceptional services." At the beginning of September in the same year he was transferred from the Italian Engineer Service to be temporary Captain in the Navy. Senatore Marconi visited the United States in 1917 as Member of the Official Mission sent by Italy to the U.S.A. Government. The world-famous University of Columbia invested their distinguished visitor with the honorary degree of Doctor of Science on June 6th, 1917.

Marriott, Robert Henry.—Born 1879. First experimented with wireless telegraphy in 1899, while student at the Ohio State University, U.S.A. In 1901 he was employed by the American Wireless Telephone and Telegraph Company, at Philadelphia, for which Company he erected stations at Breille, Galilee and Barnegat, N.J. He then became Chief Engineer of the Pacific and Continental Wireless Telephone and Telegraph Company, and in 1902 installed three stations in California, at Avalon, Santa Catalina Island, and San Pedro. In 1903 he was employed with the Carstarphen Electric Company at Denver, Colorado. In 1905 he constructed stations for the American De Forest Wireless Telegraph Company, and its successor, the United Wireless Telegraph Company, in Colorado, Wyoming, and Texas. He was placed in charge of this Company's construction and maintenance in 1910. In 1911 he entered the employ of the Marconi Wireless Telegraph Company of America, and the following year entered the U.S. Government service as Radio Inspector. Chairman, 1916, Seattle Section Institute of Radio Engineers, member of the Committee on Standardisation, Fellow and Past-President, The Wireless Institute, 1909-1912. He is now expert radio aid, U.S. Navy.

Meyer, Niels.—Director of Telegraphs to the Danish Government. Born at Rendsburg, Holstein, in 1856. He studied at the Polytechnic Academy of Copenhagen from 1872. He entered as a cand.-polyt. in 1878, and during the same year became assistant in the building department of the Royal Dockyard. In 1880 a State Railway traffic learner, he became in 1882 telegraph engineer attached to the State Railways in Jutland and Funen. Since 1897 he has acted as Director of Telegraphs in Denmark. He holds several Danish Orders and a number of foreign decorations.

Mitsuru Saeki—*see* Saeki, Mitsuru.

Murray, James Erskine—*see* Erskine-Murray.

Nally, Edward Julian.—Born in Philadelphia, April 11th, 1859, son of P. and Mary (Cullen) Nally. Common school education. Married Lee Warren Redd, of Lexington, Ky., June 10th, 1897; children Marylee and Edward Julian. Mr. Nally is a telegraph

official of the U.S.A., president of the Pan-American Wireless Telegraph and Telephone Company, Marconi Telegraph Cable Company, Inc.; vice-president and general manager, also director, of the Marconi Wireless Telegraph Company of America; director and member of Executive Committee of the Marconi Wireless Telegraph Company of Canada. Pioneer in different modes of communication, he started in life as a messenger boy for the Western Union Telegraph Company, September 1st, 1875. Later he was placed temporarily in charge of the first Edison telephone exchange in St. Louis, and prepared estimates for first telegraph lines to follow all of the trans-continental railroad lines constructed during the years 1880-1900, and the opening and operation of thousands of telegraph offices throughout the land. For more than twenty-five years he was an official of the Postal Telegraph Cable Company, resigning the office of the vice-president and general manager to become the head of the foremost wireless telegraph company in the United States. This he organised for commercial service, and in 1914 opened a commercial wireless circuit between the U.S.A. and Hawaii, which in 1916 was extended to Japan. When the United States declared war on Germany he turned over the entire organisation and plant of his company to the Government, and has since been devoting his entire time to making it a most effective arm of the Government service. He is a Catholic, a Member of the National Geographic Society, American Geographical Society, American Forestry Association, Pennsylvania Society, American Irish Historical Society, vice-president National Business League, and trustee, Ossining Hospital. His permanent address is Woolworth Building, New York.

Norman, Major Sir Henry, Bart., M.P.—He is well known to the public as a politician, a keen traveller, and an accomplished man of letters. Sir Henry has always made the study of electricity one of his hobbies, and has followed the progress of wireless telegraphy with enthusiasm. He had a private wireless station in the grounds of "Honeyhanger," his home at Hindhead, previous to the outbreak of war. This was during the first fortnight worked by Sir Henry for the Admiralty and has since been closed. Assistant Postmaster-General, 1910; Chairman, War Office Committee on Wireless Telegraphy, 1912; Member of Committee on National Telegraphic Research, and P.O. Telegraph Organisation Committee; Member of British Association Committee of Radiotelegraphic Investigation, and of the International Committee of Radiotelegraphic Research; a Vice-President of the Wireless Society of London; Fellow of the Physical Society; Fellow of the American Institute of Radio Engineers; officer of the Legion of Honour; F.R.G.S.; Asso. I.E.E.; and Liaison Officer with the French Government for Military Inventions.

Orchiston, J., M.I.E.E.—Chief Engineer of Telegraphs, Wellington, New Zealand, was born in Aberdeen, Scotland, in 1857, and arrived in New Zealand with his parents in 1862. He joined the Telegraph Department as a cadet in January, 1874, and shortly afterwards was placed in charge of the Hawera office. After performing the duties appertaining to Officer-in-Charge and Postmaster

for three and a half years, he was transferred to the Technical Branch of the service. At the age of 21 he was an Acting Sub-Inspector in charge of all construction works in the Wellington district. During the month of August, 1880, he was promoted to the rank of Sub-Inspector, and placed in charge of the Auckland telegraph district. In 1894 his designation was altered to that of Inspector, and he was transferred to the Otago district, being finally promoted to the position of Chief Engineer at Wellington, in January, 1911.

Pannill, Charles Jackson.—Born Petersburg, Va., May 13th, 1879. At 19 years of age entered Navy during Spanish-American War, and made Chief Telegrapher of United States Coast Signal Service. Entered service of Professor Reginald A. Fessenden, at Old Point, Va., in 1902, and conducted experiments in radio communication across Hampton Roads. Installed first overland communication by radio between New York and Philadelphia in 1903; also installed first radio outfit on United States battleship. Conducted experiments between stations of General Electric Company, at Lynn and Schenectady; also between Brant Rock, Mass., and Machrihanish Bay, Scotland. Holds commercial first-grade licence No. 1. Entered service of United Wireless Telegraph Company as Division Superintendent in 1909, laying out shore radio stations on Great Lakes, and later in charge of division south of New York. Entered service of Marconi Wireless Telegraph Company of America in 1912, when that company absorbed United property, and was made Superintendent, Southern Division. Entered service of United States Government in 1914 as expert radio aid, Naval Radio Service, Radio, Va. Promoted to Assistant to Director Naval Communications in charge of commercial radio service in April, 1917, when all commercial stations were taken over by the Navy for the period of the war with Germany. He is Fellow of the Institute of Radio Engineers; Member Washington Society of Engineers and Member of the Geographical Society.

Pedersen, P. O.—Professor at the Polytechnic Academy of Copenhagen. Medal for merit in gold. Born at Sig in the neighbourhood of Varde, Jutland, on June 19th, 1874. Studied at the Polytechnic Academy of Copenhagen from 1892. Became a cand.-polyt. in 1897. From 1899-1902 chief engineer of the Telegrafonen, Ltd. (Patent Poulsen); the Danish Society of Sciences' gold medal, 1907. He became lecturer at the Polytechnic Academy of Copenhagen, 1909, and professor from 1912; member of the board of the Dansk Telegrafonfabrik (Danish Telegraphphone Company, Ltd.) from 1903-1912, of the Elektroteknisk Forening (Electro-technique Association) from 1910 (Chairman from 1916), and of Det Kontinentale Syndikat for Poulsen Radio-Telegrafi (Continental Syndicate for Poulsen Radio-telegraphy) from 1911. He has published the following books: "Drahtlose Schnelltelegraphie: Veröffentlicht im Jahrhundert der drahtlosen Telegraphie und Telephonie" (Leipzig, 1911; Kopenhagen, 1912); "Le Problème du Secret dans les Communications Radiotélégraphiques: Rapport Officiel au Congrès International des Applications Electriques, Turin, September, 1911 (Copenhagen, 1912).

Petersen, H.—Inspector of Wireless Telegraphy of the Norwegian Government Telegraph Department. He was born in Christiania in 1875, and graduated as Electrical Engineer at Bergen Technical College, Bergen, Norway. Afterwards he attended the Polytechnical University at Karlsruhe, Baden, Germany. Mr. Petersen has been one of the pioneers of wireless telegraphy in Norway, and superintended the first wireless experiments in 1901. He later on formulated the schemes for all wireless land stations along the Norwegian coast. In 1911 he was Engineer-in-Charge during the erection of the wireless station at Spitzbergen, which communicates with a similar station in the utmost north of Norway. By this opportunity he wintered in the Arctic Regions. When he returned to Norway he was entrusted with the charge of the Wireless Department of the Norwegian Government, and was also appointed Wireless Government Inspector. He has published a number of books for instructional purposes, dealing with telephony, telegraphy and wireless telegraphy.

Petit, Gaston Emile.—Born in Paris in 1877, Electrical Engineer in the French Postes et Télégraphes in temporary leave; Technical Director of the Compagnie Générale de Radiotélégraphie. He was Chief of the Service of Wireless Telegraphy at the French Postes et Télégraphes from 1905 to 1911; Member of the International Conference on Wireless Telegraphy held in Berlin in 1906.

Poulsen, Valdemar.—Born in Copenhagen November 23rd, 1869. After pursuing a course of study at the University of Copenhagen, 1889-1893, he entered the technical department of the Copenhagen Telephone Company in 1893, and for a number of years superintended electrical testing operations. He is Engineer-Doctor of Science, and holds the Medal for Merit in gold with crown. He collaborated with Professor P. O. Pedersen for many years, and from 1902-16 has been a member of the board of the Telegrafonien, Ltd. (Patent Poulsen). In 1909 he joined the board of the Dansk Telegrafonfabrik, Ltd., and in 1909-11 that of the Poulsen Wireless Telephone and Telegraph Company, U.S.A. He became Fellow of the Danish Society of Sciences in 1914. In August, 1898, he initiated the telephone (Grand Prix, Paris, 1900), and in 1903 a method of generating continuous electrical waves. He received the Danish Society of Sciences' Gold Medal in 1907, and became Dr. Phil. H.C., Leipzig, in 1909. He has published the following volumes: "Un Methode pour Produire des Oscillations non Amorties et leur Emploi dans la Télégraphie sans Fil"; and "La Téléphonie sans Fil: Rapport Officiel au Congrès International des Applications Electriques," Turin, September, 1911 (Copenhagen, 1912).

Preece, Llewellyn.—Son of the late Sir William H. Preece. He is one of the principal partners in the firm of Preece, Cardew and Snell, Consulting Engineers to the Crown Agents to the Colonies, and to the High Commissioners of New Zealand and South Africa. During the last thirteen years he has been largely responsible for the wireless telegraph work in connection with the Crown Colonies, which has been placed in the hands of his firm.

Pupin, Dr. Michael I.—Director of Research Laboratory of Columbia University, U.S.A., and President, Institute of Radio Engineers. Born in Hungary, October 4th, 1858, of pure Serb ancestry. In 1874 he went to the United States, where he studied at the Columbia University, graduating in 1883. His study was continued at Cambridge, England, and at Berlin, and, returning to the United States, he became Professor of Mathematical Physics at the Columbia University in 1891. Among his first original work may be mentioned the development of electrical resonance, before the introduction of wireless telegraphy. Patents issued to him on electrical selectivity were licensed to Marconi's Wireless Telegraph Company in 1903. He has worked extensively in the development of his inventions in connection with telephones and telegraphs, and many of his improvements are known by his name throughout the world. For the past two years he has been engaged in the development of a new method of electrical selectivity to be used in connection with wireless telegraphy. He has also been engaged in research work in wireless telephony.

Rayleigh, The Rt. Hon. Lord.—Born on November 12th, 1842. He was educated at Torquay and at Trinity College, Cambridge. In 1865 he graduated in the Mathematical Tripos as Senior Wrangler, and was awarded the first "Smith's Prize." His work in Physics has been of a varied and thorough character. He has contributed to the Royal Society some important communications on the "Propagation of Electrical Waves Round the Bend of the Earth." These, and other Memoirs, have been reprinted in 5 vols. of "Scientific Papers" (Cambridge University Press).

Redfield, William Cox.—United States Secretary of Commerce. Born at Albany, N.Y., June 18th, 1858. From 1885 to 1905 he was engaged in the manufacture of iron and steel forgings, tools, etc., at Brooklyn. From 1902-3 he acted as Commissioner of Public Works for the Borough of Brooklyn, and in 1910 was elected to the 62nd Congress to represent the 5th New York District. As Secretary of Commerce he is closely associated with wireless telegraphy in the United States, the department of which he is the chief being responsible for the enforcement of the wireless communication laws and the International Radiotelegraphic Convention.

Righi, Professor Augusto.—Born at Bologna in 1850, and educated at the University there. He was Professor of Physics from 1873 to 1880 at the Bologna Technical Institute; 1880 to 1885 at the Palermo University; from 1885 to 1889 at the Padua University; and since 1890 at the Bologna University. Professor Righi has published many important papers on physics, among which may be mentioned "Hertzian Waves," in 1900; "Telegraphy Without Wires" (in collaboration with B. Dessau), in 1902, etc.

Robison, Samuel S., Captain U.S. Navy and member of the Institute of Radio Engineers.—Born May 10th, 1867. He graduated from the U.S. Naval Academy in 1888, and from 1904-1906 was placed in personal charge of the Division of Radiotelegraphy in the Bureau of Equipment, Navy Department, and in general charge from 1909-1911. He has ever since been very closely associated with the

further development of this section of Naval Radio work. He is the author of the "Manual of Wireless Telegraphy for Naval Electricians," first issued in 1906, and revised for several subsequent editions.

Saeki, Mitsuru.—Born in 1871. Entered the Naval Academy, 1889, but left the school and entered the Electro-Technical Laboratory, 1896, as one of the assistants of Dr. Osuke Asano. In 1906 he was appointed Wireless Engineer to the Department, and took charge of the Installation and Inspecting Section of the Department. Nearly all Government commercial wireless stations in Japan were designed and erected by him, including Choshi, the first wireless telegraph station in Japan in 1908.

Saltzman, Brigadier-General C. McK.—He is a native of the State of Iowa, and graduated at the United States Military Academy at West Point in 1896. As a Cavalry officer he took part in the battles near Santiago de Cuba of the Spanish-American War of 1898, and later on acted as Signal Officer during the Insurrection in the Philippine Islands. In 1901 he was transferred to the Signal Corps of the U.S. Army, and has since been identified with the electrical, cable and radio work of the U.S. Army. General Saltzman was for a number of years in charge of the Electrical Laboratory of the Signal Corps in Washington, where radio equipment of the U.S. Army is designed and tested, and in charge of the radio work of the U.S. Army on the Panama Canal. He represented the United States at the International Radiotelegraphic Conference in London in June, 1912, and has recently been placed in charge of the Signal Section of the U.S.A. Army.

Sankey, Captain M. P. H. Riall, C.B., R.E. (ret.).—This distinguished officer was born at Nenagh, Ireland, in 1853; educated in Switzerland; at the Royal Military Academy, Woolwich; and at the School of Military Engineering, Chatham. He then served in England, at Gibraltar, and as Instructor in Fortification at the Royal Military College, Kingston, Canada. On his return to this country he was posted to the Ordnance Survey, and had charge of the Trigonometrical Division, the Electrotyping Department and the Work-shops. In 1889 he retired from the service to join the Board of Messrs. Willans and Robinson, Ltd., and in 1904 he took up consulting work. Shortly afterwards he joined the Boards of the Marconi Wireless Telegraph Company, Limited, and of the Marconi International Marine Communication Company, Limited. He is an accepted authority on thermo-dynamic problems. He is a member of the following institutions: Civil Engineers, Mechanical Engineers, American Mechanical Engineers, Electrical Engineers, Iron and Steel, Naval Architects, and Gas Engineers. He is a member of the Governing Board of the National Physical Laboratory, and of the Wireless Telegraphy and Gaseous Explosives Committees of the British Association. He joined up at the beginning of the war, and has been appointed for the duration of the war Hon. Engineering Advisor to the Director of Fortifications and Works. He is also serving on the Hon. Valuation Advisory Committee of Experts, dealing with the plant and buildings installed by manufacturing firms for munition purposes.

Sarnoff, David.—Was born in Russia, February, 1891, and entered the United States in July, 1900. Mr. Sarnoff started at the bottom of the business ladder in 1906, and in 1907 received an appointment as Wireless Operator at the Marconi Station located at Siasconset, Nantucket Island, Mass. Later on he served at various Ship and Shore Stations, and eventually became Manager at the Marconi Station at Sea Gate. He has held a number of responsible positions in the service of the Marconi Wireless Telegraph Company of America, being now Commercial Manager. He was elected Secretary of the Institute of Radio Engineers for 1915 and 1916, and re-elected for 1917. Amongst the important articles on various subjects connected with Wireless for which he has been responsible, we may mention a paper read by him on Radio Traffic before the Institute of Radio Engineers, and a number of other papers on Wireless Telegraphy.

Saunders, Henry Spearman.—Born April, 1841, he is the son of the Hon. Frederick Saunders, who was Treasurer of Ceylon, to which office the latter was succeeded by his eldest son, Sir Frederick Richard Saunders, K.C.M.G. Mr. Henry S. Saunders joined his parents in Ceylon at the age of eighteen, and he devoted himself with conspicuous ability and success to the public and commercial life of the colony. Mr. Saunders was for two years the Chairman of the Ceylon Planters Association, and was instrumental in carrying through important schemes of railway extension and the construction of roads. In 1899 Mr. Saunders joined the board of Marconi's Wireless Telegraph Company, and accompanied Mr. Marconi to America on board the s.s. *Philadelphia* in 1902.

Schjeldermann, Helmuth Joh. Christian.—Electrical Engineer-in-Chief in the Danish Navy; Knight of the Dannebrog; Fellow of the Danish Engineers' Association. Born 1876. Studied in the Navy and at the Polytechnic Academy of Copenhagen. Since 1904 attached to the Telegraph Department. Electrical adviser to the Light-house Department. Leads since 1909, together with Alexander William Bjarnov, the examination of wireless operators and the inspection of wireless stations on board ships flying Danish flag. Has published: "*Lærebog i Radiotelegrafi og Radiotelefoner: Udarbejdet til Brug ved Sominekorpset*" (text-book on Wireless Telegraphy and Telephony, worked up for the use of the Danish Torpedo Department), and "*Elementær Elektricitetslære*" (text-book on Elementary Electricity).

Shunkichi Kimura—see **Kimura Shunkichi.**

Solari, Marquis Luigi.—Born in Turin, he was promoted officer of the Italian Royal Navy in 1890. He obtained the diploma of Electrical Engineer at the University of Turin in 1898. In 1900 he was in charge of the Laboratory of Wireless Telegraphy at the Royal Dockyard of Spezia. He superintended the installation of several land and ship stations. In 1902 he was in charge of the wireless telegraph station on the Italian warship *Carlo Alberto* during the historic experiments on that vessel conducted by Senatore Marconi. The Marquis Solari wrote the official report of the

experiments made for the first time across the European continent between the Poldhu station (England) and the *Carlo Alberto* in the Mediterranean. In 1903 he was a delegate of the Italian Government at the Berlin Wireless Conference. In 1904-1905 he was in charge of the Wireless Telegraph Department of the Italian Ministry of Posts and Telegraphs, and in the month of September, 1904, as official delegate of the Italian Government at the International Congress of Electricity held at St. Louis, U.S.A., he read a paper on the Development of Wireless Telegraphy. He is joint inventor with Professor Lori, of the Padua University, of a magnetic relay. He has published several papers on wireless telegraphy in various periodicals and reviews. Since 1906 he has devoted himself to the development of the Marconi system in Italy.

Squier, Major-General George Owen.—Chief Signal Officer U.S. Army, and formerly military attaché to the American Embassy in London. He was educated at Johns Hopkins University, Baltimore, where he gained the degree of Doctor of Physics in 1893, and worked as a research student under the late Professor Rowland. He was working in the laboratory of the late Sir William Preece at the Post Office at the time that Mr. Marconi conducted his early demonstrations before the officials of that organisation. On June 28th, 1911, an important treatise by him, dealing with multiplex telephony and telegraphy by means of waves guided by wires, was read before the American Institute of Electrical Engineers. He is the author of numerous papers on the subject of wireless telegraphy and has devoted special attention to the use of wireless telegraphy in military operations. In 1912 he was awarded the Elliott Cresson Gold Medal for his researches in multiplex telephony. In June, 1915, he presented a paper on "Cable Telegraphy" to the Physical Society of London advocating the adaptation of Wireless Engineering methods to ocean cables.

Stanley, Rupert.—Born in Ireland during 1876 he received his early education at Irish schools and universities. He joined the technical staff of the Isle of Thanet Electrical Light and Power Company in 1899, and two years later was appointed to the post of Lecturer in Physics and Electrical Engineering at the Brighton School of Science and Technology. He returned to Belfast in 1903 as Professor of Physics and Electricity at Belfast Municipal Institute. He became a Member of the Institution of Electrical Engineers, and in 1914 undertook the preparation of a "Textbook of Wireless Telegraphy," which—published after the outbreak of war—has become a standard textbook on the subject, both at home and in America. Professor Stanley started his war service as second-in-command of a Field Company in the Ulster Division, but was soon transferred to radiotelegraph work, and in March, 1915, assumed command of the dépôt at the Wireless Training Centre. The French President has made him Chevalier of the Legion of Honour in recognition of his services.

Stone Stone, John.—Studied electricity, chemistry, physics and mathematics at Columbia University and Johns Hopkins University. From 1890-1899 he was with the American Bell Telephone Company as experimentalist in its research laboratory. In 1892 he made



MR. ANDREW GRAY, CHIEF ENGINEER OF MARCONI'S WIRELESS
TELEGRAPH COMPANY.

(For biographical details, see page 1096.)

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some investigations in wireless telephony for that Company. In 1899 he was Consulting Electrical Engineer and expert for the Ladd Wireless Telephone Syndicate, experimenting on directional signalling. He was retained in 1900 by the Stone Wireless Telephone Syndicate, and in 1902 when the Stone Telegraph and Telephone Company was organised. He is the author of many scientific papers on wireless. He has been granted more than 100 U.S. patents in the radio field and a correspondingly large number of foreign patents. Fellow, American Academy of Arts and Sciences; Fellow American Association of Advanced Science; Fellow and Past-President, Institute of Radio Engineers; and a member or associate of the following societies: American Institute of Electrical Engineers. American Electro-Chemical Society, U.S. Navy Institute, Franklin Institute, Mathematics and Physics Club, Boston Scientific Society. His investigations have been principally directed along the lines of preventing interference in wireless telegraphy.

Swinburne, James, F.R.S.—Born at Inverness on February 28th, 1858, and educated at Clifton College. He has had a wide experience, and as far back as 1881 he was employed by Messrs. J. W. Swan and Co. to organise their lamp factory in Paris; later he went on a similar mission to America. He has practised as a consulting engineer since 1894, and has attained considerable eminence in various branches of science. As an expert on wireless telegraphy his fame has been recognised by the Government, who in 1912 appointed him a member of the Technical Committee considering the Imperial Wireless Scheme. He is also a member of various scientific societies, and is on the Council of some. In 1902-3 he was President of the Institution of Electrical Engineers.

Swinton, Alan A. Campbell, F.R.S.—Born in Scotland in 1863, he commenced his career in 1882 in the famous Elswick Works, where he was apprenticed to the late Lord (then Sir William) Armstrong. In 1887 he went to London, where, since that date, he has practised as a consulting electrical engineer, and has been responsible for the carrying out of many large electrical installations. He is a director of a number of electricity supply and engineering manufacturing companies, and has been associated with the development of the Parsons turbine and other important inventions. He is a member of the Institutions of Civil, Electrical and Mechanical Engineers, is chairman of the Council and vice-president of the Royal Society of Arts, and is a Past-President of the Röntgen Society. He is a member of the Executive Committee of the British Science Guild, and from 1912-15 was a Manager of the Royal Institution of Great Britain. He has devoted considerable attention to scientific research, including wireless telegraphy, and is President of the Wireless Society of London. In 1915 he was elected a Fellow of the Royal Society.

Tesla, Nikola.—Born at Smiljan, Sika, Dalmatia, in 1857. One of the foremost of the world's electricians. Quite early in life he began to take delight in arithmetic and physics. He graduated at Carlstatt in 1873, and thenceforward devoted his energy to electrical

studies and investigations; he went to Gratz, where, at the Polytechnic School, he prepared for work as Professor in mathematics and physics. Whilst there he was so struck with the objections to the use of commutators and brushes that he made up his mind to remedy that defect in dynamo-electric machines. About 1882 he proceeded to America, where he captured the attention of the whole world with his fascinating experiments on high-frequency electric currents. Since 1890 he has devoted himself almost entirely to studies of alternating currents of high frequency and very high potentials.

Todd, David Wooster, Commander, U.S. Navy.—Born at Round Valley, California, June 29th, 1874; educated in private and public schools in Michigan, Nevada, and San Francisco, California; appointed to Naval Academy, 1891, was graduated in June, 1895; has served at sea on the following vessels of the United States Navy: *Constellation, Monongahela, Olympia, Oregon, Wheeling, Rainbow, Chicago, Iowa, Newark, Denver, Monterey, Concord, Galveston, Wyoming*, and was last in command of the *Dixie*. Captain Todd has served ashore as instructor in ordnance at the Naval Academy; in charge of the Radio Division of the Bureau of Steam Engineering, Navy Department, as well as Assistant Superintendent of the Radio Service. He attended the International Radio-Telegraphic Conference in London, 1912, as a Delegate, and on August 3rd, 1916, was appointed Director Naval Communications, succeeding Captain W. H. G. Bullard, U.S. Navy, Superintendent of Naval Radio Service.

Torikata—see **Wichi Torikata**.

Travailleur, Maurice.—Born at Brussels in 1871 and graduated as engineer at Brussels University in 1893. At the age of twenty-six he was appointed electrical engineer to the late King of the Belgians. He was one of the founders of *La Société Anonyme de Télégraphie Sans Fil* in 1901, of which he is now managing director.

Tsiang Tseng-yi.—Director-General of the Chinese Telegraph Administration, is a native of the Haining District of the Chekiang Province. In 1904 he acquired the third degree of Literature at the Metropolitan Examination in Peking and was appointed as Junior Clerk of the Board of Revenues and soon afterwards transferred in the same rank to the Board of Communications (then known as Yuchuanpu) by its special recommendation for dealing with telegraph matters. The Chinese Telegraphs were then administered partly by a Commercial Company and partly by the Provincial Viceroys and Governors. Mr. Tsiang proposed that all the commercially and provincially owned telegraph lines be nationalised and placed under the direct control of the Yuchuanpu, so that the system might possibly be made uniform throughout the country. This proposal received the approval of the Government, and was put into operation. Since 1910 the Chinese Government has devoted a part of the telegraph revenues to the extension of the Telephone and Wireless telegraph services. In 1911 Mr. Tsiang, in the capacity of the Commissioner of Telegraphs of the Yuchuanpu,

caused two powerful Radio stations to be established, one in Peking and the other at Nankin. Since their establishment the Wireless service has been greatly improved and extended to such localities as Shanghai, Woosung, Foochow, and Canton, along the coasts and Kalgan and Wuchang in the interior. Both the Ministries of War and Navy have followed in the steps of the Ministry of Communications by installing Radio stations for their respective purposes. Mr. Tsiang has served over ten years in the telegraph service, holding the following important positions: 1910-1911, the Commissioner of Telegraphs of the Yuchuanpu; 1913-1916, Chief of the Financial Department of Telegraphs, Posts and Navigation, and at present, Chief of the Telegraph Department and Director-General of Telegraphs of the Ministry of Communications, besides holding the post of Chairman of the Chinese Society of Electrical Science.

Turpain, Professor Albert.—Born at La Rochelle on December 2nd, 1867, he was employed in the Department of Posts and Telegraphs of France from 1884 to 1887. In 1888 he became a licentiate in physical science, and three years later a licentiate in mathematics, obtained his doctorate of science in 1889. Since 1894, when, as a tutor of physics at the Faculty of Science at Bordeaux, he succeeded in sending messages by means of wireless telegraphy from the equipment which was erected in the college buildings, he has experimented in wireless telegraphy with successful results. He applied himself to the question of tuning and in 1899 he experimented with a means for determining the direction of electromagnetic waves; he took up these experiments again in 1912. In 1911 he succeeded in obtaining graphic records of time signals by means of a micro-ampere-meter over a distance of 300 km. between Poitiers and Paris. He carried out successful experiments in recording photographically wireless telegraph signals which passed between Paris and Poitiers.

Van der Pol, Balth, jun.—Born at Utrecht, Holland, on January 27th, 1889, he received his school and university training at Utrecht, graduating as *Candidaat* (a degree equivalent to the B.Sc. of London) in 1914; and after a further two years' devotion to the study of Experimental and Theoretical Physics, under Professors Julius and Ornsten, achieved the distinction of *Doctorandus* in 1916. His interest in the theory and practice of wireless dates from 1904, and he came over to England in the fall of 1916 to study for a year under Professor J. A. Fleming, transferring his scene of activities to Cambridge in 1917, where he is now working under Professor Sir J. J. Thomson, at the Cavendish Laboratory. He is author of a number of valuable monographs upon radio-telegraphic subjects.

Vallauri, Giancarlo.—Born in Rome in 1882. He was educated in the classical schools of Italy, then entered the Royal Naval Academy, and was appointed officer of the Royal Italian Navy in 1903. After a few years at sea he quitted the active naval service and joined the Polytechnic School in Naples, obtaining the diploma of engineer and the electrotechnic diploma in 1907. He has since conducted electrical tuition in the Polytechnic Schools of Padua, Karlsruhe,

and Naples. He has been connected with many industrial electric establishments and has placed his services at the disposal of the Royal Navy for the installation of wireless stations. In 1912 he inaugurated at the Polytechnic School in Naples a course in Wireless Telegraphy, and supervised that subject till the end of 1916, when he was called to the direction of the new Institute of Electricity and Wireless Telegraphy of the Royal Navy. For several years his main attention has been turned to the study of ferromagnetic phenomena, to which he has given important contributions. He has recently published a series of papers on Ionic Valves, which have won wide publicity and appreciation.

Vanni, Dr. Giuseppe.—Born at Albano Laziale (Rome) in 1862. Graduated in science in 1887, and went to Strassburg in 1890, where, under Professor Kohlrausch, of the Physical Institute, he occupied himself especially with the study of electrical measurements. In 1894 he was appointed to teach physics at the Collegio Romano, Rome, where he remained till 1912, when he was nominated professor and director of the physical laboratory of the Military Radiotelegraphic Institute in Rome. In 1912 he took part in the International Radiotelegraphic Conference of London as a member of the Italian delegation, and also at the Conferences held in Paris in 1912 and 1913. His works are principally concerned with electrology, electrical engineering, and electrical waves. By means of a hydraulic microphone of his invention he made interesting experiments in wireless telephony, and his paper on the "Progress and Actual State of Wireless Telegraphy and Telephony" gained for him in 1914 the Cagnola prize of the Royal Lombard Institute of Science and Literature, in Milan.

Vyvyan, R. N.—The eldest son of the Rev. C. G. Vyvyan, and educated at Charterhouse, received his electrical and engineering training at Faraday House. It was whilst holding the position of engineer to a storage battery company that he first became interested in wireless telegraphy, and joined the Marconi's Wireless Telegraph Company at the beginning of 1900. In 1901 he proceeded to Canada with Senatore Marconi, to build the Glace Bay Station, and remained in Canada until 1908. In the course of his wireless activities Lieutenant Vyvyan has at various times visited South Africa, Spain, Russia, France and Norway. He has executed much important work for the Admiralty, which kept him fully occupied until the autumn of 1916, when he applied to be released in order to join the Royal Flying Corps, with which he is now serving.

Walter, L. H., M.A., A.M.I.E.E.—Born in London in 1870, and educated at private schools in England and at Hanover, Germany; also at Trinity College, Cambridge (1894-8), where he took honours in Natural Sciences, and later carried out research work in the University Engineering Laboratory. He then became experimental assistant to Sir Hiram S. Maxim. In 1903 he was appointed Editor of *Science Abstracts*, when that publication was taken over by the Institution of Electrical Engineers, which position he still holds. He has invented several forms of detectors of electrical oscillations, and for his magnetic type of oscillation galvanometer was awarded the

John Scott Medal. In 1905 he drew attention to the advantages of directive wireless telegraphy, and, associating himself with Captain Tosi and Dr. Bellini, at that time making their first experiments, he introduced the directive system, and the wireless compass, into England.

Weagant, Roy A.—Born at Morrisburg, Ontario, Canada, in 1881. Educated at Stanstead College, Stanstead, Quebec, Canada, and at McGill University, Montreal, Canada. Graduated from Electrical Engineering Course, 1905. Studied physics under Sir Ernest Brotherford and first became interested in wireless through witnessing some of his experiments in Hertzian waves. He gained engineering experience with the Montreal Light, Heat, and Power Company, the Westinghouse Electric Manufacturing Company, of Pittsburgh, Pa., and the De Laval Steam Turbine Company. He took up commercial wireless work in 1908 and entered service of the Marconi Wireless Telegraph Company of America in 1912. He is a Fellow of the Institute of Radio Engineers and member of its Board of Directors and Standardisation Committee.

Wibier, Major Albert.—Attached to the Headquarters Staff of the Belgian Army. Was born at the little town of Renaix, in Eastern Flanders, a little over six miles south of Oudenarde, on June 3rd, 1876. Major Wibier early turned his attention to wireless telegraphy, and between the years 1911 and 1912 installed and organised the whole network of wireless telegraphic communication in the Belgian Congo. He is now head of the Radiotelegraphic Service in the Belgian Army, and Director-General of Wireless Telegraphy in Belgium's African Possessions.

Wichi Torikata.—Born in Japan in 1883, Mr. Wichi Torikata is now the Chief Engineer of the Wireless Section in the Japanese Department of Communications, and holds also the same position with regard to the Electric Material Section attached to the Electro Technical Laboratory. He was trained to the profession of Electrical Engineering in the Engineering College of Tokio Imperial University, graduating at the College in 1906. Ever since these early days he has devoted himself to the close study of Radiotelegraphy and Telephony, acting at one time as Assistant Engineer to Dr. Osuke Asano, ex-Director of the Electro Technical Laboratory. Later on he received the appointment of Chief Engineer to the Wireless Section of the Laboratory, a position which he continues to hold. More recently he undertook, in addition to his Wireless duties, to act as Chief Engineer of the Electrical Material Section at the Laboratory. A number of miscellaneous inventions stand to his credit, and amongst other devices, of which he is patentee, are included the Koseki or Mineral Detectors, and the T.Y.K. Oscillation Gap for use in Radiotelephony. The late Mikado of Japan recognised his services by awarding him the Fifth Degree of Decoration, bestowing this honour specifically for his services in connection with Wireless Detectors, whilst the Ruling Emperor has presented him with the Fourth Degree of Decoration on account of his Radiotelephonic Researches. Considerable attention was attracted by his essay on "Some Researches in Radio-

telegraphy and Telephony," and the Senate of Tokio University marked their appreciation of his efforts by bestowing upon him in 1915 the title of "Dr. Engineer." In addition to the above-mentioned decorations he has received many prizes for technical work. These latter include the First Medal of the Japanese Electric Engineers' Society (established in 1888), besides the Academy Prize and Medal granted by the Japanese Imperial Academy. Mr. Torikata displays a special interest in the education of the rising generation, and holds the position of Lecturer in Raidotelegraphy and Telephony to the Electric Engineering College of Kyusliu Imperial University.

Wien, Professor Max.—Born at Königsberg in 1866. He made a special study of the subject of physics under Helmholtz and others, and assisted Röntgen from 1891 to 1893. He has devoted considerable attention to the study of electromagnetic waves and their propagation.

Yokoyama, Eitaro.—Born in 1883, and graduated at the Engineering College of the Tokyo Imperial University in 1908. He is Wireless Engineer to the Department of Communications, and co-operates with Dr. W. Torikata in wireless work in the Electro-technical Laboratory. He is one of the inventors of T.Y.K. oscillations gap of radiotelephony. He was granted the Academy prize and medal of the Japanese Imperial Academy, and has received the 5th Order of Merit for his wireless investigations and inventions.

Zenneck, Professor J.—Born April 15th, 1871, in Wurtemberg. The son of a clergyman, he was intended for a similar career, and studied for four years in a Theological College at Tübingen. While at Tübingen he studied mathematics and natural history, particularly zoology, from 1889 to 1894, and in the latter year he passed the State examination in these subjects; he obtained his doctorate in 1894. After a course of natural history studies in London and elsewhere he devoted himself entirely to physics, and from 1895 to 1899 he was an assistant in the Physical Institute in Strassburg. From 1899 to 1900 he was engaged in making tests with wireless telegraphy in the North Sea. Five years later he became lecturer as assistant professor of Physics in the Technical College, Dantzic, and in 1906 he was appointed professor of Physics at the Technical College, Brunswick. This position he vacated in 1909, when he joined one of the largest mechanical works in Germany, and in 1911 he returned to Dantzic as professor of the Technical College.

OBITUARY.

THE year 1917 has witnessed two sad bereavements in the world of radiotelegraphic science. France and England have each lost a distinguished son, and mourn their departure from a national point of view. But the decease of Commandant Tissot and that of William Du Bois Duddell have inflicted a loss upon humanity at large, and not merely upon the nations to which they respectively belong.

CRUISER CAPTAIN CAMILLE TISSOT, Officer of the Legion of Honour and Doctor of Sciences, passed away at Arcachon on October 2nd, 1917, aged forty-eight years. This distinguished Frenchman was the first to utilise the Bolometer for the purpose of quantitative analysis in wireless and to initiate a system of measurement for calculating with precision the current of the receiving antennæ. He was able to deduce therefrom the law of capacities and the numerical factor which figures therein. In conjunction with Colonel Ferrié he did much useful pioneer work in the introduction of international time signals, whilst the lectures, magazine articles, and other publications due to his pen, combine with his life labours to ensure for him an enduring niche in the Temple of Fame.

WILLIAM DU BOIS DUDELL, Fellow of the Royal Society, and for two years President of the Institution of Electrical Engineers, passed away at his residence in Victoria Street, Westminster, on Sunday, November 4th, 1917, at the early age of forty-five. A born research-worker and experimentalist, Mr. Duddell showed the bent of his genius from his earliest days. The success which he won was, moreover, attained in the teeth of physical weakness, which was really responsible for his early decease. To wireless men perhaps the most interesting factor of his work is that connected with the "singing arc," from which the Poulsen arc was evolved. Like many other distinguished members of the world of science, he had placed his energies at the disposal of his country since the outbreak of war, and at the time of his death was a member of the Admiralty Board of Inventions and Research, the Munitions Inventions Committee, and the Advisory Council for Industrial Research.

LITERATURE OF WIRELESS TELEGRAPHY AND TELEPHONY.

THE literature upon the subject of wireless telegraphy and telephony has now become so large that the following collection of representative books and journals should be found useful. The bibliography is by no means complete, but we think that few, if any, of the important works are not included. In addition, there are the reports of the various International Radiotelegraphic Conferences and the "Nomenclature" issued by the Berne Bureau.

THE BOOKS MENTIONED IN THE FOLLOWING PAGES (AND OTHERS) CAN BE OBTAINED, AT THE PUBLISHED PRICE, FROM THE WIRELESS PRESS, LTD., MARCONI HOUSE, STRAND, LONDON, W.C., ON RECEIPT OF REMITTANCE AND COST OF POSTAGE.

BELGIUM.

- Aperçu sur la Télégraphie Sans Fils en Belgique.** By PAUL DUBOIS. Pp. 120. Imprimerie La Meuse, Liège.
- A Propos de Télégraphie Sans Fil (La Loi du 8 Juillet, 1908, et les Signaux F.I.).** By M. L. VANDEVYVER. Pp. 20. H. Rosseeuw, Ghent, 1912.
- La Télégraphie Sans Fil.** By LEON VAN AERSCHODT. Pp. 27. 0.50 francs. Larcier, Brussels, 1913.
- La Télégraphie Sans Fil Appliquée à la Météorologie aux Prévisions du Temps, et à l'étude de la physique du globe.** By A. BOUTQUIN. Pp. 40. 1 franc. Larcier, Brussels, 1911.
- La Télégraphie Sans Fil et la Téléphonie Sans Fil.** By F. FONTAINE. Pp. 115, 1 figure. 3 francs. Imprimerie La Meuse, Liège, 1911.
- Note sur la Télégraphie Sans Fil.** By M. PIERARD, Professor at Brussels University.

BRAZIL.

- Telegrapho Sem Fio.** By RICARDO FREDERICO DE LIMA. Published by Officina Typographica da Escola Gerson, Rio de Janeiro.

DENMARK.

- Laerebog I Radiotelegrafi Og Radioteleoni.** By H. SCHLEDERMANN. Kr. 6.50.

FRANCE.

- Applications de la Télégraphie sans Fil (Les).** Par E. ROTHÉ. 2ème édition, 1917. In-8 étroit. 6-7 figures. Relié percaline. 4 francs. Librairie Berger-Levrault, 5-7, Rue des Beaux Arts à Paris.

- Applications pratiques des ondes électriques. Télégraphie sans Fil, etc.**
Par TURPAIN (Albert). 2ème édition, 1908. In-8. 412 pages, 271 figures, cartonné. 12 francs. Librairie Gauthier-Villars and Cie, 55, Quai des Grands Augustins à Paris.
- Carnet d'Enregistrement des Dépêches Météorologiques Transmises par Télégraphie Sans Fil. Avec Instructions Pratiques pour la Lecture et la Traduction de ces Dépêches.** 2nd edition. 1 franc. L. Geisler, 1, Rue de Médecis, Paris.
- Guide pratique de la réception en télégraphie et en téléphonie sans Fil.**
Par DUROQUIER (Franck). Editeurs, Arrault, Tours. 1914.
- La Technique de la Radiotélégraphie.** By REIN. Translated from the German by G. Viard. 9 francs. Gauthier-Villars, Editeurs, 55, Quai des Grands Augustins, Paris.
- La Télégraphie Sans Fil.** By BERGET. Francs 2.50. Hachette et Cie., Paris.
- La Télégraphie Sans Fil.** By ANDRE BROCA. 2nd edition. 4 francs. Gauthier-Villars, Editeurs, 55, Quai des Grands Augustins, Paris.
- La Télégraphie Sans Fil.** By E. CONSTET. 100 pp. Francs 1.25. Charles Mendel, 118, rue d'Assas, Paris.
- La Télégraphie Sans Fil.** By E. PETIT and L. BOUTHILLON. Ch. Delagrave, Editeur, 15, Rue Soufflot, Paris.
- La Télégraphie Sans Fil et La Loi.** By A. PERRET-MAISONNEUVE. With Preface by M. DALIMIER. 7 francs. H. Desforges, 29, Quai des Grands-Augustins, Paris.
- La Télégraphie Sans Fil (la Télémécanique et la Téléphonie Sans Fil à la Portée de Tout le Monde).** By R. MONIER. Preface by DR. BRANLY. Pp. 242. Librairie Dunod et Pinat, Paris.
- Les Applications de la Télégraphie Sans Fil.** By P. JÉGOU. Pp. 70. Librairie Desforges, Paris.
- Les Oscillations Electriques (Principes de la Télégraphie Sans Fil).**
By C. TISSOT. Octave Doin and Fils, Editeurs, 8, Place de l'Odéon, Paris.
- Les Oscillations Electro-Magnetiques et la Télégraphie Sans Fil.** By J. ZENNECK. Translated from the German by G. Blanchin, G. Guérard and E. Picot. 2 volumes, Part I., 17 francs. Part II., 17 francs. Gauthier-Villars, Editeurs, 55, Quai des Grands Augustins, Paris.
- Manuel Élémentaire de Télégraphie Sans Fil.** By C. TISSOT. 5 francs. Augustin Challamel. Troisième édition, 1917. Editeur, Rue Jacob, 17, Paris.
- Notions Élémentaires et Pratiques de T.S.F. A l'Usage des Personnes Voulant Recevoir les Signaux Horaires et les Dépêches Météorologiques de la Tour Eiffel.** By E. BAUDRAN. Francs 2.50. L. Geisler, 1, Rue de Médecis, Paris.
- Notions Générales sur la Télégraphie Sans Fil et la Téléphonie Sans Fil.**
By DE VALBREUZE. 12 francs. Librairie Béranger, 15, Rue des St. Pères, Paris. 6th edition.

- Précis de Télégraphie Sans Fil.** By J. ZENNECK. Translated from the German by G. Blanchin, G. Guérard and E. Picot. 12 francs. Gauthier-Villars, Editeurs, 55, Quai des Grands Augustins, Paris.
- Réception des Signaux Horaires Radiotélégraphiques.** By the Bureau des Longitudes. Francs 2.75. Librairie Gauthier Villars, 55, Quai des Grands Augustins, Paris. 1913 edition.
- Signaux Horaires et Radiotélégrammes Météorologiques transmis chaque jour par la tour Eiffel.** Francs 1.25. Octobre. 1913. Gauthier-Villars, Editeurs, 55, Quai des Grands Augustins, Paris.
- Télégraphie sans Fil (La) et les Ondes Electriques.** Par J. BOULANGER et G. FERRIE. 8ème edition, 1917. 487 pages. 255 figures. 10 francs. Librairie Berger-Levrault, 5-7, Rue des Beaux Arts, Paris.
- Télégraphie Sans Fil (Réception des signaux horaires et des télégrammes météorologiques).** By DOCTEUR P. CORRET. Pp. 92. Édition du Cosmos, 5, Rue Bayard, Paris.
- Télégraphie sans Fil dans les rapports internationaux.** Par DEVAUX JACQUES. Editeurs, A. Pedone. 1914.
- Télégraphie sans Fil.** Par NANTY (Abbé). A. Rey, Lyon. 1914.
- Téléphonie sans Fil et la Télégraphie sans Fil.** Par A. BERTHIER. Editeurs, H. Desforges, 29, Quai des Grands Augustins à Paris.
- Téléphonie sans Fil.** Par SCHEIDT-BOON, 36, Rue de Mons, Valenciennes. 1914.
- Théorie de Maxwell et les Oscillations Hertiennes (Le). La Télégraphie sans Fil.** Par H. POINCARÉ. 3 édition, 1908. In-8. 97 pages, 9 figures, cartonné. 2 francs. Librairie Gauthier-Villars & Cie, 55, Quai des Grands Augustins à Paris.
- Théorie simplifiée de la Télégraphie sans Fil, 1917.** Par VERDURAND. Editeurs, Dunot et E. Pinat, 47-49, Quai des Grands Augustins à Paris. 2 francs.
- Traité Élémentaire de Télégraphie et de Téléphonie Sans Fil.** By E. DUCRETET. Pp. 89. 3 francs. Paris: R. Chapelot et Cie.

GERMANY.

- Der elektrische Lichtbogen.** By H. TH. SIMON. Verlag S. Hirzel, Leipzig, 1911.
- Der Lichtbogen als Wechselstromerzeuger.** By WILLY WAGNER. M.3.60. Verlag S. Hirzel, Leipzig, 1910.
- Der radiotelegraphische Gleichstrom-Tonsender.** By H. REIN. Verlag Julius Springer, Berlin, 1912.
- Die Drahtlose Telegraphie und ihr Einfluss auf den Wirtschaftsverkehr, unter besonderer Berücksichtigung des Systems Telefunken.** M.3. Verlag Julius Springer, Berlin, 1905.
- Die elektrischen Wellentelegraphie.** By O. ARENDT. M.7. Verlag Fr. Vieweg & Sohn, Braunschweig (Brunswick), 1907.
- Die Fortschritte auf dem Gebiete der drahtlosen Telegraphie.** By ADOLF PRASCH. M.8.40. Verlag Ferd. Enke, Stuttgart, 1906.

- Die Funkentelegraphie.** By A. SLABY. M.2. Verlag Julius Springer, Berlin, 1897.
- Die Funkentelegraphie.** By H. THURN. Second ed. Verlag B. G. Teubner, Leipzig, 1913.
- Die Funkentelegraphie im Recht.** By H. THURN. Verlag J. Schweitzer, Leipzig, 1913.
- Die Radiotelegraphie.** By O. NAIRZ. Verlag J. A. Barth, Leipzig, 1908.
- Die Telegraphie Ohne Draht.** By A. RIGHI u. B. DESSAU. M.16.50. Verlag Fr. Vieweg u. Sohn, Braunschweig (Brunswick). Second ed. 1907.
- Die Telephonie ohne Draht.** By H. MARKAU. Verlag Fr. Vieweg & Sohn, Braunschweig (Brunswick), 1912.
- Drahtlose Telegraphie.** By G. EICHHORN. M.5. Verlag Veit u. Co., Leipzig, 1904.
- Drahtlose Telegraphie und Telephonie.** By G. PARTHEIL. M.6. Second ed. Verlag Gerdes & Hödel, Berlin, 1911.
- Elektromagnetische Schwingungen und Drahtlose Telegraphie.** By J. ZENNECK. M.28. Verlag Ferd, Enke, Stüttgart, 1905.
- Entdeckungsfahrten in den elektrischen Ozean.** By A. SLABY. Verlag von Leonhard Simion, Nachf., Berlin, 1911.
- Experimentelle Untersuchungen aus dem Grenzgebiet zwischen drahtloser Telegraphie und Luftelektrizität.** By M. DIECKMANN. 2.Heft. "Luftfahrt u. Wissenschaft." M.3. Verlag Julius Springer, Berlin, 1912.
- Frequenzmesser und Dämpfungsmesser.** By EUGEN NESPER. Verlag Veit & Co., Leipzig, 1907.
- Handbuch für Funkentelegraphisten.** By O. OHLSBERG. M.6. R. v. Decker's Verlag, Berlin, 1911.
- Jahrbuch der Schiffbautechnischen Gesellschaft** (containing Articles by A. SLABY, Vol. I., 1900; F. BRAUN, Vol. 6, 1905; GRAF ARCO, Vol. 9, 1908; H. BREDOW, Vol. 13, 1912). M.40 per volume. Verlag Julius Springer, Berlin.
- Lehrbuch der Drahtlosen Telegraphie.** By J. ZENNECK. M.15. Verlag von Ferd, Enke, Stüttgart, 1913.
- Lehrbuch der drahtlosen Telegraphie und Telephonie.** By FRANZ ANDERLE. Second ed. Verlag Franz Deuticke, Leipzig u. Wien (Vienna), 1912.
- Leitfaden der drahtlosen Telegraphie für die Luftfahrt.** By MAX DIECKMANN. M.8. R. Oldenbourg, München.
- Physik des Aethers auf Elektromagnetischer Grundlage.** By P. DRUDE. (New edition edited by W. KÖNIG.) M.16. Verlag von Ferd, Enke, Stüttgart, 1912.
- Radiotelegraphisches Praktikum.** By H. REIN. M.8. Second ed. Verlag Julius Springer, Berlin, 1912.
- Telegraphie und Telephonie ohne Draht.** By OTTO JENTSCH. M.5. Verlag Julius Springer, Berlin, 1904.

GREAT BRITAIN.

Some important works in English on Wireless Telegraphy are published in the United States, and the reader is recommended to consult also the list given under the heading of U.S.A.

Alternating Current Work. By W. PERREN MAYCOCK. Whittaker and Co. 7s. 6d. net.

Amateur Wireless Telegraph Designs. By ALFREC. 1914, new edition. 2s. 6d. net. Electrician Printing and Publishing Co., Ltd.

Autobiography of an Electron, The. By CHARLES R. GIBSON, F.R.S.E. 8 illustrations. Pp. 215. Long 8vo. 3s. 6d. net. Seeley, Service & Co.

Calculation and Measurement of Inductance and Capacity, The. By W. H. NOTTAGE, B.Sc. 144 pages. Illustrated. Price 2s. 6d. Post free 2s. 10d. The Wireless Press, Ltd. Marconi House, Strand, London, W.C.

Continuous Current Motors and Control Apparatus. By W. PERREN MAYCOCK. Whittaker and Co., London. 6s. net.

Dynamo and Motor Attendants and their Machines. By F. BROADBENT, M.I.E.E. 2s. 10d.; post free. S. Rentell and Co.

Economics of Telegraphs and Telephones, The. By JOHN LEE, Traffic Manager, Post Office Telegraphs. In crown 8vo. Cloth gilt. 2s. 6d. net.

Electrical Pocket Book (Spon's). By WALTER H. MOLESWORTH. E. and F. Spon, London. 6s. net.

Electrical Instruments in Theory and Practice. By W. F. MURDOCH, B.Sc., and U.A. OSCHWALD, B.A. Whittaker and Co. 10s. 6d. net.

Electric Waves. By H. HERTZ. Translated by D. E. JONES, B.Sc. Pp. 298. 10s. net. Macmillan and Co., Ltd.

Electric Waves. By Professor WM. S. FRANKLIN. Pp. 326. 12s. 6d. net. Macmillan and Co., Ltd.

Electromagnetic Theory of Light. Part I. By C. E. CURRY, Ph.D. Pp. 416. 12s. net. Macmillan & Co., Ltd.

Electron Theory, The (a Popular Introduction to the New Theory of Electricity and Magnetism). By E. E. FOURNIER, B.Sc., with a preface by Dr. G. JOHNSTONE STONEY, F.R.S. 5s. net. Longmans, Green & Co.

Elements of Electrical Transmission, The. By O. J. FERGUSON. Pp. 466. 15s. net. Macmillan & Co., Ltd.

Elementary Lessons in Electricity and Magnetism. By SILVANUS P. THOMPSON, D.Sc., F.R.S. Illustrated. New Issue with important additions, 1915. Macmillan and Co. Fcap. 8vo. 4s. 6d.

Elementary Manual of Radiotelegraphy and Radiotelephony for Students and Operators. By Dr. J. A. FLEMING, F.R.S. Third and revised edition. Longmans, Green and Co. 8s. net.

Elementary Mathematics—A Short Course in—and their Application to Wireless Telegraphy. By S. J. WILLIS. Wireless Press, Ltd., London. 3s. 6d. net.

Elementary Practical Mathematics. By F. CASTLE. Price 3s. 6d. net. Macmillan and Co., Ltd.

Elementary Principles of Wireless Telegraphy, The. Part I. By R. D. BANGAY. Crown 8vo. Pp. 212. Price 2s. 6d. net, post free 2s. 9d. The Wireless Press, Ltd., Marconi House, Strand, London, W.C.

[This book is a Primer for beginners and has been adopted by many training institutions as a text book.]

Elementary Principles of Wireless Telegraphy, The. Part II. By R. D. BANGAY. Price 2s. 6d. net. Post free 2s. 9d. Wireless Press, Ltd., Marconi House, Strand, London, W.C.

[Deals thoroughly with problems met with in small and medium power wireless telegraph installations; and includes valuable chapters on oscillation valves.]

Handbook for Wireless and Inland Telegraph Operators. By CHARLES WARD. 1s. 3d. net; post free. Nicholls and Co., Ltd.

Handbook of Technical Instruction for Wireless Telegraphists. By J. C. HAWKHEAD. Revised by H. M. DOWSETT, M.I.E.E. 242 illustrations and diagrams. Pp. 344. 4s. 6d. Post free 4s. 11d. The Wireless Press, Ltd., Marconi House, Strand, London, W.C.

[This book is a sound and trustworthy guide through a course of instruction on wireless telegraphy, which should enable the diligent reader to qualify for the Postmaster-General's certificate.]

Handbook of Wireless Telegraphy. By Dr. J. ERSKINE-MURRAY. Pp. 442. 10s. 6d. net. Crosby Lockwood and Son.

History of the Theories of Æther and Electricity (from the Age of Descartes to the Close of the Nineteenth Century). By Dr. E. T. WHITTAKER, F.R.S. 12s. 6d. net. Longmans, Green & Co.

How to Make a Wireless Set. By A. MOORE. Cloth 8vo. Pp. 84. 2s. 6d. net. S. Rentell and Co., Ltd.

Intermediate Textbook of Magnetism and Electricity. By G. F. WOODHOUSE, M.A. Sedbergh, Jackson and Son. 6s. net.

Magnetism and Electricity for Beginners. By H. E. HADLEY, B.Sc. (Lond.) Globe 8vo. 2s. 6d.

Magnets and Electric Currents. By J. A. FLEMING, M.A., D.Sc. E. and F. N. Spon. 5s.

Maintenance of Wireless Telegraph Apparatus. By P. W. HARRIS. Wireless Press, Ltd., London. 2s. 6d. net.

Making Wireless Outfits (an Explanation of the Construction and Use of an Inexpensive Wireless Equipment for Sending and Receiving up to 100 miles). By NEWTON HARRISON. (1909.) Pp. 61. 1s. 6d. net. E. & F. N. Spon.

Miscellaneous Papers. By H. HERIZ. Translated by D. E. JONES and G. A. SCHOTT. 10s. net. Macmillan & Co., Ltd.

Modern Theory of Physical Phenomena, Radio-activity, &c. By AUGUSTO RIGHI. Translated by A. TROWBRIDGE. Pp. 180. 5s. net. Macmillan & Co., Ltd.

Modern Views of Electricity. By SIR OLIVER LODGE, F.R.S. Third edition. Pp. 534. 6s. Macmillan & Co., Ltd.

Morse Made Easy. A new card for rapidly learning the Morse Code, Post free 3½d. The Wireless Press Ltd., Marconi House, Strand, London, W.C.

Plans and Specifications for Wireless Telegraph Sets. By A. F. COLLINS. (Part I. One-five miles.) 1s. 6d. net. E. & F. N. Spon.

Plans and Specifications for Wireless Telegraph Sets. (Part II. Five-ten miles.) 1s. 6d. net. E. & F. N. Spon.

Pocket Book—the Wireless Telegraphists'—of Notes, Formulæ, and Calculations. (Containing formulæ, tables, and examples of calculations required in practical radiotelegraphy.) By J. A. FLEMING, M.A., D.Sc., F.R.S. 6s. net. Post free 6s. 4d. The Wireless Press, Ltd., Marconi House, Strand, London, W.C.

Practical and Experimental Wireless Telegraphy. By W. J. SHAW. 42 illustrations. Pp. 102. 3s. 6d. net. (1914.) E. & F. N. Spon.

Practical Wireless Slide Rule. By Dr. H. R. HICKMAN. Electrician Printing and Publishing Co., Ltd. 2s. 6d.; leather, 3s. Postage, 3d.

Principles of Electric Wave Telegraphy and Telephony, The. By Dr. J. A. FLEMING, F.R.S. Revised edition. Longmans, Green & Co. 30s. net.

Principles of Wireless Telegraphy. By G. W. PIERCE. 12s. 6d. net.

Radiodynamics. By B. F. MIESSNER. Crosby, Lockwood and Co. 9s. net.

Radiotelegraphist's Guide and Log Book, The (a Manual for the Use of Operators). By W. H. MARCHANT. 4s. 6d. net. Whittaker & Co.

Relativity and the Electron Theory. By E. CUNNINGHAM, M.A. Longmans, Green and Co. 4s. net.

Scientific Ideas of To-day. By CHARLES R. GIBSON, F.R.S.E. With 42 illustrations. Pp. 344. Extra crown 8vo. 5s. net. Seeley, Service & Co.

Small Power Wireless Installations. By MAURICE CHILD. Pp. 123. 1s. net. Percival Marshall & Co.

Story of Wireless Telegraphy. By ALFRED T. STORY. New and revised edition. Pp. 225. 1s. net. Hodder & Stoughton.

Studies in Radio-activity. By PROF. W. H. BRAGG, F.R.S. 5s. net. Macmillan & Co., Ltd.

Studies in Terrestrial Magnetism. By Dr. C. CHREE, F.R.S. 5s. net. Macmillan & Co., Ltd.

Submarine Telegraphs (with an Appendix on Wireless Telegraphy). By CHARLES BRIGHT, F.R.S.E. Pp. 800. £3 3s. net. Crosby Lockwood & Son.

Test Questions in Wireless Telegraphy, in Card form:—Series 1.—The Elementary Principles of Wireless Telegraphy. 1a.—Book of Model Answers. Series 2.—Elementary Electricity and Magnetism. (Elementary and advanced.) The P.M.G.'s Examination. 2a.—Book of Model Answers. Series 3.—Covering subjects dealt with in Bangay, Part II. 3a.—Answers. Price 1s. 8d. each series (answers separate) post free. The Wireless Press, Ltd., Marconi House, Strand, London, W.C. [These Test Cards are based on the

"Elementary Principles of Wireless Telegraphy," "The Handbook of Technical Instruction for Wireless Telegraphists" and other well-known text books. The Test Cards are so arranged as to form a system of self-examination whereby the student may check the progress made in his studies.]

Text Book of Wireless Telegraphy. By RUPERT STANLEY, B.A., M.I.E.E. 8s. net. Longmans, Green and Co (Re-printing),

Waves and Ripples in Water, Air and Æther. Being a course of lectures delivered at the Royal Institution of Great Britain. By J. A. FLEMING, M.A., D.Sc., F.R.S., etc. Second issue, revised. 94 illustrations and diagrams. Pp. 300. Large crown 8vo. 2s. 6d. net.

Wireless Diary and Note Book. Price 3s. net; post free, 3s. 3d.; morocco, 6s. Published annually. A leather pocket book with diary and note book specially ruled for wireless operators. The Wireless Press, Ltd., Marconi House, Strand, London, W.C.

Wireless Telegraphy and Hertzian Waves. By S. R. BOTTONE. (1910.) 2s. 6d. net. E. & F. N. Spon.

Wireless Telegraphy and Telephony. A Handbook of Formulæ, Data, and information. By W. H. ECCLES, D.Sc. 18s. net. The Electrician Printing and Publishing Co., Ltd. (New edition in preparation.)

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Miami Wireless Association—Miami, Fla. H. Henshaw, R.F.D.1.

Minnesota Wireless Association—Minneapolis, Minn.

Mountain States Radio Association—Denver, Colo. C. Newmann, 1523, So. Ogden Street.

National Amateur Wireless Association—42, Broad Street, New York City. Guglielmo Marconi, Pres.

Nebraska Radio Association—Lincoln, Nebr. A. T. Stratton, 1449. "S" Street.

New England Wireless Association—125, Milk Street, Room 99, Boston, Mass.

New Haven Wireless Association—27, Vernon Street, New Haven, Conn.

New London Radio Club—New London, Conn. P. Tilden, 23, Williams Street.

Norfolk Radio Society—Norfolk, Va. J. Ross, c/o Gun Storekeeper, U.S. Navy Yard.

Norristown Radio Club—Main Street and Franklin Avenue. D. Walker, 552, Kohn Street.

Nyack Y.M.C.A. Radio Club—Nyack, N.Y. M. E. Robertson, 98, Piermont Avenue.

Oakland Wireless Club—Oakland, Calif—916, Chester Street.

Oklahoma Radio Experimental Association—Oklahoma City, Okla. C. Smith, 922½, W. Main Street.

Oregon State Wireless Association—348, William Street, Portland, Oregon. E. L. Bischoff, Sec.

Pacific States Wireless Association—Los Angeles, Calif. 288, Wilcox Avenue.

Pacific Wireless Club of Oregon—405, East Market Street, Portland, Oregon.

Pasadena Radio Association—Pasadena, Calif. Sec. C. W. Patton, 195, N. Hill Avenue.

Pittsburgh Wireless Association—6031, Kirkwood Street, Pittsburgh, Pa.

Pomona Wireless Club—Pomona, Calif. Sec. H. Gates.

Port Huron Radio Club—Port Huron, Mich. C. Thompson, 815 Wall Street.

Portland Radio Club—13, Forest Avenue, Portland, Me. C. T. Beardsley.

Port Townsend Radio Club—Port Townsend, Wash. G. Hunter, 518, Willow Street.

Power City Wireless Association—Niagara Falls, N.Y.

Puget Sound Wireless Association—Seattle, Wash. V. Kraft, 6519, 19th Avenue, N.E.

Radio Association of Md.—Arlington, Md. Bancroft Park. R. Dimling, Sec.

Radio Club of Hartford—Hartford, Conn. M. Steele, 1202, Park Street, W. Hartford.

Radio Club—Irvington, N.J. A. Oechler, 82, Smith Street.

Radio Club of Framingham—Framingham, Mass. J. L. Reynolds 135, Vanderbilt Hall, Sheffield Scientific School, New Haven, Ct.

Radio Club of Redlands—Redlands, Calif. 108, Eleventh Street. H. Williamson.

Radio Club of Thomson—Thomson, Ga. C. Morris, 104, W. Hull Street.

Radio Club of Flint—Flint, Mich. I. Carr, 426, Roosevelt Avenue.

Radio Club, Y.M.C.A.—Trenton, N.J. H. Atkinson, Sec.

Radio Club of New Rochelle—New Rochelle, N.Y. T. Harvard, 48, John Street.

Radio Club of Union College—Schenectady, N.Y.

Radio Club of Port Richmond—Port Richmond, S.I. H. E. Ballentine, 17, Sharp Avenue.

Radio Council—So. Gary, Ind., 200, W. Ridge Road. W. Blaemire.

Radio Research Society of Mt. Vernon—Mt. Vernon, N.Y. W. Morgan, 149, Urfan Street.

Rogers High School Radio Club—Newport, R.I. C. N. Clarkson, 17, Gibbs Avenue.

Rochester Wireless Association—Rochester, N.Y. C. Stand

Sacramento Radio Club—Sacramento, Calif. Sec. R. Coover, 1613, 19th Street.

Sacramento Wireless Signal Club—Sacramento, Calif. 2119, H. Street,

St. Paul Wireless Club—184, Walnut Avenue, Santa Cruz, Calif.

St. Petersburg Wireless Association—St. Petersburg, Fla. C. C. Allen, Big Bayou.

St. Louis Radio Club—3817, Olive Street, St. Louis, Mo. H. Blatterman.

San Francisco Radio Club—San Francisco, Cal., 350, Frederick Street. H. Lee, 1580, Grove Street.

Scott High Radio Club—Scott High School, Toledo, Ohio. W. K. King, Pres.

Senn Radio Association—Senn High School, Chicago, Ill.

Society of Radio Research—Atlanta, Ga. A. B. Cory, 379, N. Jackson Street.

Southern Wireless Association—1435, Henry Clay Avenue, New Orleans, La.

South Side High School—Newark, N.J. H. Wersfelder.

Springfield Wireless Association—323, King Street, Springfield, Mass.

Spring Hill Amateur Wireless Association—2, Benton Road, Somerville, Mass.

Suburban Radio Club—Washington, D.C. C. Longfellow, Jr. 5515, Potomac Avenue.

Sylvan Engineers—Sylvan Grove, Kans. G. C. Hitchcock, Sylvan Grove.

Technical Wireless Association—E. L. Powell. 216, Spruce Avenue, Takoma Park, Md.

Technical Wireless Association—1206, E. Capitol Street, Washington, D.C.

Texas Wireless Association—1212, Prairie Avenue, Houston, Tex.

Toledo Wireless Club—1024, Erie Street, Toledo, Ohio.

Topeka Radio Club—Topeka, Kansas. R. L. Morehouse, Hyland Park.

Tri-State Wireless Association—Memphis, Tenn. C. De La Hunt, Pres., 346, Winchester Avenue.

Troop 28 Boy Scouts—Epworth M.E. Church. 121, Nash Street, Hartford, Conn.

Two Hundred Meter Radio Club of Newton—A. M. Hunt, Madison Avenue, Newtonville, Mass.

Union County Radio Association—Roselle Park, N.J. 137, Westfield Avenue, R. E. Timbrook.

United Wireless Relay Club—Passaic, N.J., 102, High Street.

Waco High School Radio Club—Waco, Tex. P. Deeby, 535, Proctor Avenue.

Washington Wireless Club Trenton, N.J. M. Pillsbury, Washington Market.

Waterbury Wireless Association—Waterbury, Conn., 26, London Street.

Welcome Wireless Association—185, Chauncey Street, Brooklyn, N.Y.

Western Wireless Union of America—A. C. Cameron, 19, S. Fifth Avenue, Chicago, Ill., U.S.A.

Wichita Wireless Association—Butts Building. C. V. Williams, 525, N. Emporia Avenue.

Wildwood Radio Association—Wildwood, N.J. L. Chalmers, 125, Burk Avenue.

Wireless Association of Atlantic City—Atlantic City, N.J. C. Cramer, 11, States Avenue.

Wireless Association of Central Calif—Fresno, Calif. 860, Callish Street.

Wireless Association of Central Pa.—409, Kelker Street, Harrisburg, Pa.

Wireless Association of Greater Ft. Smith—Greater Ft. Smith, Ark.

Wireless Association of Keene—172, Elm Street, Keene, N.H.

Wireless Association of Milwaukee—824, Nineteenth Avenue, Milwaukee, Wisc.

Wireless Association of Montana—309, South Ohio Street, Butte, Mont.

Wireless Association of New England—Filene Building, Boston, Mass. H. Hill.

Wireless Association of New Orleans—New Orleans, La., 2022 State Street.

Wireless Association of Penna—Odd Fellow Temple, Phila., Pa.

Wireless Association of Savannah—Savannah, Ga, 303, Price Street.

Wireless Association of So. Calif—Los Angeles, Calif, 935, Denver Avenue.

Wireless Association of Tuft's College—Medford, Mass.

Wireless Club of Montclair Academy—Montclair, N.J. H. Warner, Gt. Notch, N.J.

Wireless Club of Y.M.C.A.—Gloucester, Mass. F. Essig, Y.M.C.A.

Wireless Relay Club—Jacksonville, Fla. E. Peer, 419, West Duval Street.

Wireless Society of Springfield—Box 562, Springfield, Mass.

Y.M.C.A. Wireless Club—Williamsport, Pa., 211, West Fourth Street.

Young Edison Society—Rogers, Ark.

Young Marconi's Wireless Association—P. H. Bolton, 1024, Erie Street, Youngstown, Ohio.

Youngstown Radio Club—Youngstown, O.—P. Brenner, 516, Plum Street.

CODE SIGNALS

IN the following pages are shown general alphabetical tables for making international code signals by means of the fixed semaphore, and signals by means of the British movable semaphore. Through the courtesy of Messrs. James Brown and Son, Glasgow, we are able to reproduce from "Brown's Signalling" tables showing the British method of semaphoring by hand flags. In the British method, the person intending to semaphore makes the international code signal V O X, "I am going to semaphore to you," and sets his semaphore at the alphabetical signal, with the indicator out, and waits until the ship to which the semaphore signal is to be made hoists her answering pennant "close up." Then he will proceed with the communication by spelling, making a momentary pause between each sign or letter; the arms are to be dropped between each word or group, the indicator only remaining out.

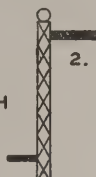
Should the answering pennant be dipped by the person taking in the signal, the last *two* words are to be repeated until the answering pennant is again hoisted "close up," which denotes that the person taking in the semaphore signal is ready to read and write down the signal. It is to be dipped when a word is lost, and the person making the signal is then to repeat the *two* last words until the answering pennant is hoisted again "close up."

The British method of semaphoring by flags held in the hand which is shown is exactly the same as the British movable semaphore system, the positions of the apparatus which denote the letters, numbers, and special signs being identical in each case, the only difference being in the apparatus employed.

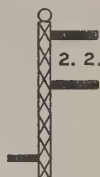
The French method of semaphoring by hand flags is based on the same principle as the British method, but the positions in which the flags are held to denote the letters, etc., are different.

GENERAL ALPHABETICAL TABLE FOR MAKING THE INTERNATIONAL CODE SIGNALS BY MEANS OF DISTANT SIGNALS BY FIXED SEMAPHORE.

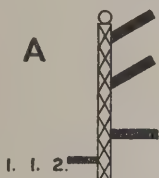
PREPARATIVE,
ANSWERING, OR
STOP, AFTER EACH
COMPLETE SIGNAL



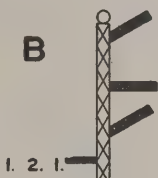
ANNUL THE
WHOLE SIGNAL



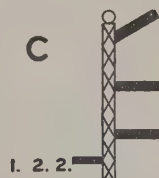
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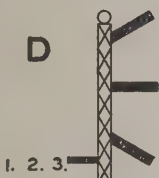
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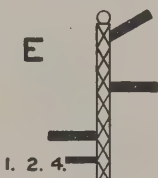
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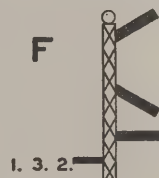
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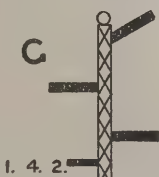
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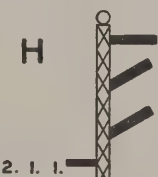
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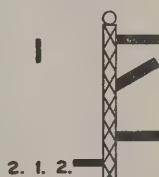
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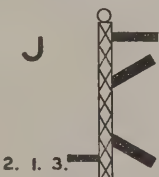
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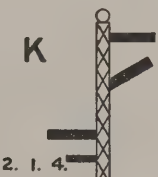
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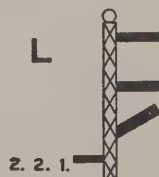
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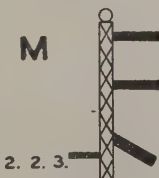
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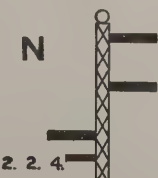
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N


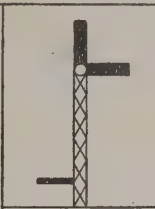
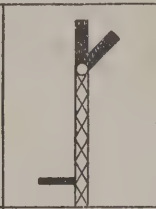
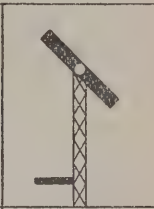

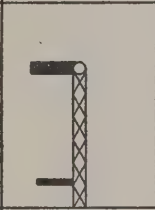




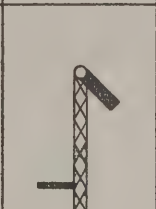


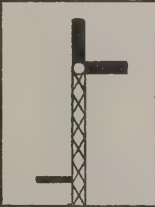
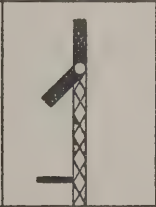
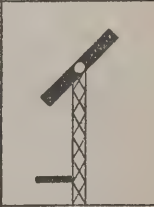




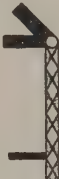











O



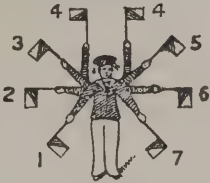
















GENERAL ALPHABETICAL TABLE FOR MAKING THE INTERNATIONAL CODE SIGNALS BY MEANS OF DISTANT SIGNALS BY FIXED SEMAPHORE.

<p>P</p> <p>2. 3. 2.</p>	<p>Q</p> <p>2. 3. 3.</p>	<p>R</p> <p>2. 3. 4.</p>
<p>S</p> <p>2. 4. 1.</p>	<p>T</p> <p>2. 4. 2.</p>	<p>U</p> <p>2. 4. 3.</p>
<p>V</p> <p>3. 1. 2.</p>	<p>W</p> <p>3. 2. 1.</p>	<p>X</p> <p>3. 2. 2.</p>
<p>Y</p> <p>3. 2. 3.</p>	<p>Z</p> <p>3. 2. 4.</p>	
<p align="center">SPECIAL SIGNS.</p>		
<p>CODE FLAG</p> <p>4. 2. 1.</p>	<p>ALPHABETICAL</p> <p>4. 2. 2.</p>	
<p>NUMERICAL</p> <p>4. 2. 3.</p>	<p>FINISHING, AFTER COMPLETION OF WORD OR NUMBER</p> <p>4. 3. 2.</p>	














SEMAPHORE SIGNS	GOVERNING SIGNS			
	FULL STOP A-A-A			
	REPEATED THREE TIMES IN QUICK SUCCESSION	ALPHABETICAL	NUMERICAL	ANNUL OR NEGATIVE
SIGN				
ALPHABETICAL	A	B	C	D
NUMERICAL	1	2	3	4
SIGN				
ALPHABETICAL	E	F	G	H
NUMERICAL	5	6	7	8
SIGN				
ALPHABETICAL	I	J	K	L
NUMERICAL	9	ALSO ALPHABETICAL	O	
<p>NOTE.— IF A NUMERICAL SIGNAL IS TO BE FOLLOWED BY WORDS, THE END OF THE NUMERICAL SIGNIFICATION OF THE SIGNS IS SHOWN BY THE ALPHABETICAL SIGN BEING MADE, INDICATING THAT SPELLING IS AGAIN TO COMMENCE</p>				

SIGN				
ALPHABETICAL	M	N	O	P
SIGN				
ALPHABETICAL	Q	R	S	T
SIGN				
ALPHABETICAL	U	V	W	X
SIGN				
ALPHABETICAL	Y	Z		

NOTE.— IF A NUMERICAL SIGNAL IS TO BE FOLLOWED BY WORDS, THE END OF THE NUMERICAL SIGNIFICATION OF THE SIGNS IS SHOWN BY THE ALPHABETICAL SIGN BEING MADE, INDICATING THAT SPELLING IS AGAIN TO COMMENCE.

				
SIGN				
ALPHABETICAL	A	B	C	D
NUMERICAL	1	2	3	4
SIGN				
ALPHABETICAL	E	F	G	H
NUMERICAL	5	6	7	8
SIGN				
ALPHABETICAL	I	J	K	L
NUMERICAL	9	ALSO THE ALPHABETICAL	O	
SIGN				
ALPHABETICAL	M	N	O	P

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SIGN				
ALPHABETICAL	Q	R	S	T
SIGN				
ALPHABETICAL	U	V	W	X
SIGN				
ALPHABETICAL	Y		Z	
SIGN				
	ALPHABETICAL	NUMERICAL	ANNUL	

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LLOYD'S LIST OF SIGNAL STATIONS.

THE Society of Lloyd's, incorporated by Act of the British Parliament and the Royal Assent of Her late Majesty Queen Victoria, administers, with the sanction of Parliament, the control and working of Signal Stations in Great Britain and Ireland and in many places abroad. Various foreign Governments have also recognised the advantage of reports from signal stations and semaphores being universally collected and forwarded on identical conditions. They have arranged that reports from or to their semaphores can be obtained or forwarded through Lloyd's.

Thus one universal system of receiving and transmitting maritime reports extends over a wide area. The organisation of signal stations is made very favourable for shipowners and merchants, and the commerce of the world in general. If, for instance, a shipowner, charterer, or consignee wishes to transmit an order to any vessel at any point where she may appear, one communication to Lloyd's is sufficient to ensure the message being given at any or all of these stations as may be desired.

The charges for forwarding information from, or transmitting advices by means of signal stations are moderate. Shipowners, charterers, merchants, or consignees can obtain telegraphic intelligence at small cost with regard to any vessel in which they may be interested, or postal advices if so preferred, or can transmit orders to such vessels by merely communicating with the Secretary of Lloyd's.

Harbour and Dock Authorities, Chambers of Commerce, Exchanges, and such institutions as may require a large number of reports can arrange with Lloyd's for receiving full and regular advices from Lloyd's Signal Stations on reduced terms, for, when a number of reports are taken, a substantial reduction is made in the signalling fees. Shipowners or others who wish to be supplied with reports of vessels from any signal stations are requested to communicate with the Secretary of Lloyd's, London, E.C.3.

The following is a list of signal stations at which signals are received from and made to merchant vessels of all nations :

UNITED KINGDOM.

SOUTHEND (A)	TUSKAR ROCK (S)
*†DOVER (L)	TEMPLEBREEDY (A)
‡SANDGATE (A)	*†OLD HEAD OF KINSALE (L)
*†DUNGENESS (A)	*†FASTNET (S)
*†BEACHY HEAD (A)	*†BROW HEAD (L)
*†HORSE SAND FORT (Spithead) (S)	INISHTRAHULL (L)
*†ST. CATHERINE'S POINT (I.W.) (L)	TORR HEAD (A)
NEEDLES (I.W.) (A)	*†KILDONAN (Mouth of the Clyde) (L)
PORTLAND BILL (L)	‡LAMLASH (Mouth of the Clyde) (A)
‡BERRY HEAD (Brixham) (A)	BUTT OF LEWIS (Hebrides) (L)
*†PRAWLE POINT (L)	CAPE WRATH (L)
*†THE LIZARD (L)	DUNNET HEAD (Pentland Firth)
PENZANCE (S)	(L)
SCILLY ISLANDS (L)	ST. ABB'S HEAD (L)
LUNDY ISLAND (L)	*TYNEMOUTH (L) (Hailing Station)
*†BARRY ISLAND (A)	*†FLAMBOROUGH HEAD (A)
ST. ANN'S HEAD (Milford Haven)	SPURN HEAD (L)
(A)	HAISBRO' LIGHTSHIP (S)
THE SMALLS (S)	ALDEBURGH (A)

(L) Stations belonging to Lloyd's.

(A) Stations belonging to the Lords Commissioners of the Admiralty, but signalling is conducted at them on behalf of Lloyd's.

(S) At these stations special arrangements have been made for signalling being conducted for Lloyd's.

(*) At these stations arrangements have been made for night-watch to be kept in order to take in pyrotechnic night signals made by passing vessels whose owners have such private night signals registered by the Board of Trade. The signal to intimate that a vessel's pyrotechnic night signal has been seen and recognised is a red flare light of 30 seconds' duration.

(†) At these stations arrangements have also been made to take in, in addition to the above pyrotechnic night signals, any messages made at night by means of a flashing lamp in accordance with the Morse code as laid down in the International Code of Signals Book. Messages may be transmitted from these stations to vessels by flashing lamp in the same manner.

(‡) At these stations communication is restricted to vessels sheltering through stress of weather.

N.B.—The Fastnet and Inishtrahull stations are connected with the mainland by wireless telegraphy.

ABROAD.

EUROPE (West Coast).

- | | | |
|---|---|--|
| FAERDER
OXO | { | These stations are the property of, and are managed by, the Government of His Majesty the King of Norway. |
| VINGA (Gothenburg). This station is the property of, and is managed by, the Government of His Majesty the King of Sweden. | | |
| HELSINGBORG
EL SINORE
HAMMERSHUUS
FORNAES | { | These stations are the property of, and are managed by, the Government of His Majesty the King of Denmark. |
| *SKAGEN
HIRTSHALS
HANSTHOLM
FLUSHING (Lloyd's) | | |
| ZEEBRUGGE (Bruges Port de Mer) (Lloyd's). (Temporarily suspended.) | | |
| GRIS NEZ
USHANT CREACH | { | These stations are the property of the Government of the French Republic. |
| CAPE FINISTERRE. This station is the property of the Government of His Majesty the King of Spain. | | |
| PENICHE (Cape Carvoeiro)
OITAVOS
SAGRES (Cape St. Vincent) | { | These stations are the property of the Government of Portugal. |
| TARIFA. This station is the property of the Government of His Majesty the King of Spain. | | |

MEDITERRANEAN.

- *† GIBRALTAR (Admiralty Signal Station, Windmill Hill).
- *† CAPE SPARTEL (Lloyd's).
- | | | |
|--|---|---|
| POMEQUES (Marseilles)
CAPE CORSE (Corsica)
CAPE PERTUSATO (Corsica) | { | These stations are the property of the Government of the French Republic. |
| CAPO TESTA
(Straits of Bonifacio) | | |
| CAPO D'ARMI
(Straits of Messina)
FORTE SPURIA
(Straits of Messina) | { | These stations are the property of the Government of His Majesty the King of Italy. |
| PANTELLARIA ISLAND
MALTA (Lloyd's) | | |
| CAPE BON (Tunis). This station is the property of the Government of the French Republic. | | |
| PORT SAID (Wireless Telegraphy) (Lloyd's). | | |

AFRICA (West Coast).

- *† CAPE SPARTEL (Lloyd's).
- | | | |
|----------------------------------|---|------------------------|
| PONTA FERRARIA
PONTA DO ARNEL | { | St. Michael's, Azores. |
| | | |

* † For footnote references see page 1153.

CAPELLINHOS POINT (Fayal, Azores).

MADEIRA.

TENERIFFE.

LAS PALMAS (Grand Canary).

ST. VINCENT (Cape Verde Islands).

ASCENSION.

ST. HELENA (Ladder Hill).

CAPE COLONY.

CAPE POINT

CAPE L'AGULHAS

CAPE ST. FRANCIS

CAPE RECIFE

} These stations are the property of the
Government of Cape Colony.

AFRICA (East Coast).

*† BLUFF (Port Natal).

PORT LOUIS MOUNTAIN (Mauritius).

RED SEA AND INDIAN OCEAN.

PORT SAID (Wireless Telegraphy) (Lloyd's).

*† PERIM (Lloyd's).

ADEN.

JASK

HENJAM

RESHIRE (Bushire)

} Persian { These stations are controlled by the Indo-
Gulf { European Telegraph Department.

*† POINT DE GALLE. This station is the property of the Colonial Government of Ceylon.

SANDHEADS (River Hooghly). Lloyd's Agents at Calcutta have facilities for delivering orders.

FALSE POINT (Bay of Bengal).

SAUGOR ISLAND

MUD POINT

DIAMOND HARBOUR

HOOGHLY POINT

ACHIPUR

BUDGE BUDGE

ELEPHANT POINT

DIAMOND ISLAND

AMHERST

} River Hooghly.

} Burmah.

The above ten coast telegraph offices are the property of the Indian Telegraph Department.

* † For footnote references see page 1153.

*†SABANG BAY (Pulo Weh, N. Sumatra).

PENANG
MALACCA

†MOUNT FABER (Singapore)

†FORT CANNING (Singapore)

CAPE ST. JAMES (Saigon)

} These stations are the property of, and are controlled by, the Colonial Government of the Straits Settlements.

} This station is the property of the Government of Cochin China.

AUSTRALASIA.

*†ROTTNEST ISLAND
(W. Australia)

*†FREMANTLE
(Arthur's Head)

} These stations are the pilot signal stations for the Port of Fremantle, and are controlled by the Fremantle Harbour Trust.

*†POINT MOORE

*†CAPE NATURALISTE

*†BREAKSEA ISLAND

*†CAPE BORDA

CAPE WILLOUGHBY

CAPE JERVIS

*†CAPE NORTHUMBERLAND

*†CAPE NELSON

*†CAPE OTWAY

*†POINT LONSDALE

*†CAPE SCHANCK

*†WILSON'S PROMONTORY

*†GABO ISLAND

} These stations are the property of the Government of the Commonwealth of Australia, and are controlled by the Commonwealth Lighthouse Service.

QUEENSCLIFFE. This station is the property of the Government of Victoria, and is controlled by the Department of Ports and Harbours, Victoria.

*†GOODE ISLAND (Torres Straits). This station is the property of the Government of the Commonwealth of Australia, and is controlled by the Commonwealth Lighthouse Service.

TABLE CAPE

MERSEY BLUFF

LOW HEAD

EDDYSTONE POINT

CAPE SORELL

CURRY HARBOUR

(King Island)

BRUNI

KENT GROUP

TASMANIA

} These stations are the property of the Government of the Commonwealth of Australia, and are controlled by the Commonwealth Lighthouse Service.

(*) At these stations arrangements have been made to take pyrotechnic night signals.

(†) At these stations arrangements have also been made to take in, in addition to the above pyrotechnic night signals, any messages made at night by means of a flashing lamp in accordance with the Morse code, as laid down in the International Code of Signals Book. Messages may be transmitted from these stations to vessels by flashing lamp in the same manner.

(‡) SINGAPORE.—At these stations day watch only is kept, but if it is desired to keep watch for a vessel with a view to delivering orders during the night the aid of the Singapore Pilots Association's launch can be obtained. The charge for this launch at night time is \$5 per hour. It is desirable that owners should state always when a vessel is due to arrive for orders and also whether the vessel will wait until daylight to obtain her orders, or whether the Pilots Association's launch is to be utilised.

CAPE MARIA VAN DIEMEN
(N.Z.)

FAREWELL SPIT (N.Z.)

NUGGET POINT (N.Z.)

} These stations are the property of the
Government of New Zealand.

BLUFF HARBOUR (N.Z.). This station is the property of, and is controlled
by, the Bluff Harbour Board.

PACIFIC ISLANDS.

NORFOLK ISLAND.

FANNING ISLAND. This station is the property of the Pacific Cable
Board.

SOUTH AMERICA.

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(Valparaiso)

POINT TUMBES
(Talcahuano)

CAPE DUNGENESS
(Straits of Magellan)

CAPE VERGENES
(Straits of Magellan)

PENGUIN ISLAND

MOGOTES POINT

CAPE SAN ANTONIO

} These stations are the property of the
Government of the Republic of Chile.

} These stations are the property of the
Government of the Argentine Republic,

*† MONTEVIDEO

FLORES ISLAND

PUNTA DEL ESTE
(Maldonado).

} These stations are the property of the
Government of the Republic of Uruguay.

FERNANDO NORONHA. This station is the property of the South American
Cable Co.

WEST INDIES AND BERMUDA.

CURAÇAO (Willemstad). This station is the property of, and is controlled
by, the Colonial Government of Curaçao.

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Government of Antigua.

TURK'S ISLAND (Lloyd's).

GIBB'S HILL

FORT GEORGE } Bermuda.

NORTH AMERICA.

SAND KEY (Florida Reef).

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* † For footnote references see page 1153.

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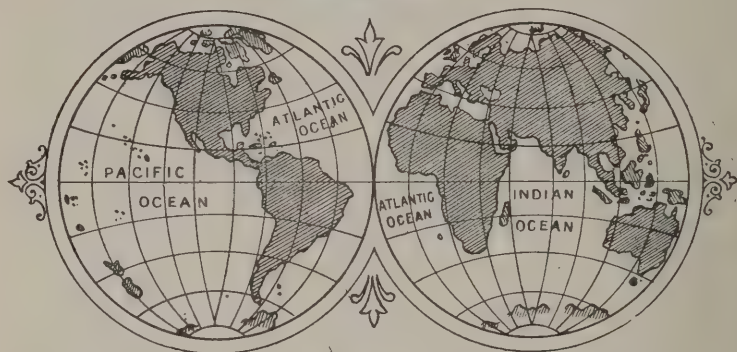
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ST. PAUL'S ISLAND (Cape Breton)	CAPE ROSIER	} Canada
AMHERST ISLAND (Magdalen Islands)	FAME POINT	
	CAPE MAGDALEN	
	FATHER POINT	

WIRELESS STATIONS.

All Wireless Shore Stations which have been established in the United Kingdom for ship to shore communication have been taken over by the General Post Office, but Lloyd's receives information from these Post Office Stations in regard to the position and movements of ships and other maritime intelligence.

GALES.

The Meteorological Office sends to the signal stations at St. Catherine's Point, Horse Sand Fort, Prawle Point, the Lizard, Lundy Island, Flamborough Head, St. Abb's Head, Dunnet Head, Brow Head, and Old Head of Kinsale telegrams announcing atmospheric disturbances near the coasts of the British Islands. The fact that one of these notices has been received at any station is made known by hoisting a cone three feet high and three feet wide at base, which appears as a triangle when hoisted. The cone is kept hoisted until dusk and then lowered, but is hoisted again at daylight next morning.

SOUTHERLY GALE—The South Cone (*point downwards*) is hoisted for gales and strong winds from S.E., veering to S.W., W., or N.W.; from S.W., veering to W. or N.W.; from W., veering to N.W.; and also from E. veering to S. or S.W.

NORTHERLY GALE—The North Cone (*point upwards*) is hoisted for gales and strong winds from S.E., E., or N.E., backing to N.; from N.W., veering to N., N.E., or E.; from N., veering to N.E. or E.; from N.E., veering to E.

THE MORSE CODE.

The Morse code as used by all countries except America is called the "Continental Morse," and is a dot and dash system throughout, with a maximum of four elements in any letter; an element is either a dot or a dash.

Whatever the speed at which signals are sent, the following rules must be remembered and strictly adhered to:

A dash is equal in length to three dots.

A space between two elements in a letter is equal in length to one dot.

The space between letters in a word is equal in length to a dash.

The space between words in a sentence is equal in length to two dashes.

THE EUROPEAN OR CONTINENTAL MORSE CODE.

a	--	m	---	z	----
ä	----	n	--	Numerals.	
á or â	-- -- -- --	ñ	-- -- -- --		
b	----	o	----	1	----
c	----	ö	----	2	----
ch	----	p	----	3	----
d	--	q	----	4	----
e	-	r	--	5	----
é	----	s	--	6	----
f	----	t	-	7	----
g	----	u	----	8	----
h	----	ü	----	9	----
i	--	v	----	0	----
j	----	w	----	.	----
k	----	x	----	?	----
l	----	y	----	!	----

AMERICAN MORSE CODE.

A	--	N	--	Numerals.	
B	----	O	--		
C	----	P	----	1	----
D	--	Q	----	2	----
E	-	R	--	3	----
F	----	S	--	4	----
G	----	T	-	5	----
H	----	U	----	6	----
I	--	V	----	7	----
J	----	W	----	8	----
K	----	X	----	9	----
L	----	Y	----	0	----
M	--	Z	----	.	----
				?	----
				!	----

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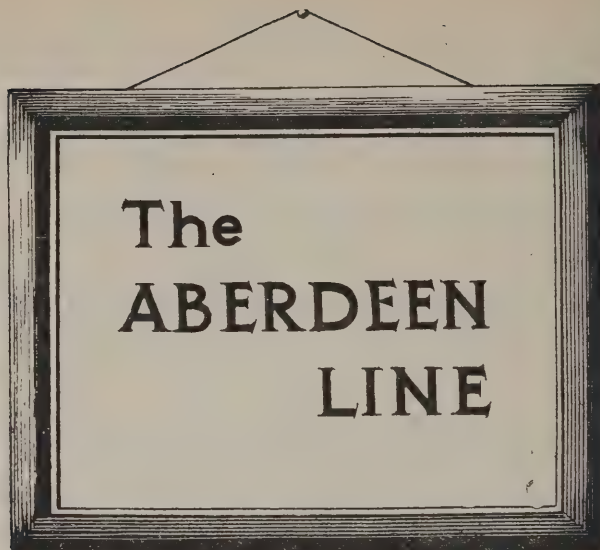
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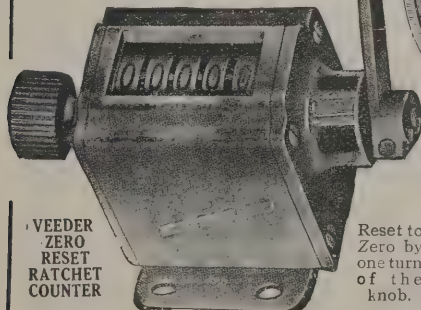
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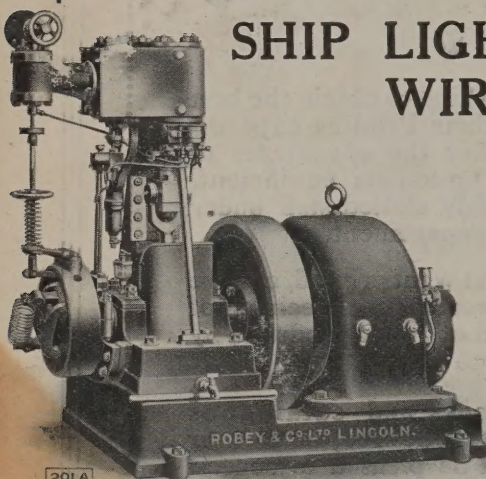
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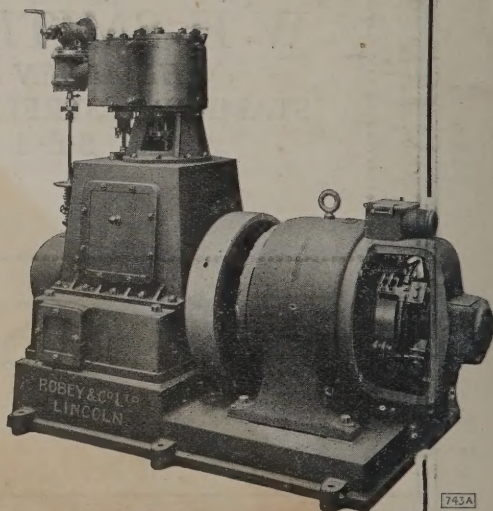
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